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REPORT FOR CONSULTATION ON THE METROPOLITAN ATLANTA INTERSTATE AIR QUALITY CONTROL REGION (GEORGIA)

National Air Pollution Control Administration
Washington, D. C.

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REPORT FOR CONSULTATION ON THE METROPOLITAN ATLANTA INTRASTATE AIR QUALITY CONTROL REGION (GEORGIA)

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Consumer Protection and Environmental Health Service

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METROPOLITAN ATLANA

INTRASTATE AIR QUALITY CONTROL REGION

(GEORGIA)

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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CONTENTS

Preface i

Introduction ii

Evaluation of Urban Factors 1

Geography of The Region 2

Present Population and Industrial Pattern of Region 4

Probable Scale of Population and Economic Growth 16

Probable Directions of Physical Growth 23

Evaluation of Technical Factors 27

The Emission Inventory 27

Air Quality Analysis 40

Meteorology. 41

Modeling Results 43

Air Sampling Data 44

Regional Governmental Organization 50

Planning Activities 50

Air Pollution Control Activities 53

Indicated Air Quality Control Region 54

Discussion 54

PREFACE

The Clean Air Act as amended directs the Secretary of Health, Education, and Welfare to designate "air quality control regions" to provide a basis for the adoption of regional air quality standards and the implementation of those standards. The Act stipulates that the designation of a region shall be preceded by consultation with appropriate State and local authorities.. This report is intended to provide the basic background information needed for the consultation. In addition, on the basis of the information developed, the report proposes boundaries for the Atlanta Intrastate Air Quality Control Region and discusses the factors underlying the proposed boundaries.

The boundaries proposed for the Region* in this report remain subject to revisions suggested during consultation with State and local authorities. Formal designation of the Region will be made only after a careful review of all opinions and suggestions submitted during the consultation process.

The National Air Pollution Control Administration appreciates assistance received from the State of Georgia, the local governments of the area and from the several planning agencies in the Region.

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*For the purposes of this report, the word "region", when capitalized, will refer to the Atlanta Intrastate Air Quality Control Region.

INTRODUCTION

THE REGIONAL APPROACH

Air pollution in the urban areas of the United States is a regional problem which frequently extends across State and local governmental boundaries. Since air pollution problems are rarely confined to any single municipality or county, successful control requires coordinated planning, standard setting, and enforcement by the several political jurisdictions which share a common problem. At the present, State and local governments across the Nation have only begun to develop a regional approach to air pollution control.

The Clean Air Act as amended provides a regional approach which depends upon coordination and cooperation between all levels of government; municipal, county, State, and Federal. To set in motion the machinery for regional air pollution control, the Department of Health, Education, and Welfare first designates air quality control regions, issues air quality criteria, and publishes reports on control techniques. The region designation indicates which State and local jurisdictions will be involved in a regional air pollution control effort. The air quality criteria indicate the extent to which various concentrations of an air pollutant are harmful to health and damaging to property. The reports on control techniques provide information on the costs and effectiveness of various techniques for controlling air pollutant emissions.

After the Department of Health, Education, and Welfare completes these initial steps, State governments develop air quality standards

and plans for implementation of those standards in areas which have been designated as air quality control regions. An air quality standard defines the desired limit of the concentration of a pollutant in the ambient air of the region. It represents the level of air quality which the regional control program will attempt to achieve. An implementation plan is a blueprint of the steps which will be taken to insure achievement of the air quality standards within a reasonable time. The Governors have 90 days from the time they are furnished the criteria and control technology reports by the Department of Health, Education, and Welfare to submit letters indicating that they intend to set standards. They have an additional 180 days to set the standards, and another 180 days to develop plans for implementing the standards. The procedure for setting standards includes a public hearing which allows residents of a region to express their views concerning the proposed central program.

The Department of Health, Education, and Welfare reviews air quality standards and implementation plans as developed by the regions in order to ascertain their consistency with the provisions of the Clean Air Act as amended.

When air quality standards and implementation plans are approved, States proceed to prevent and control air pollution in accordance with those standards and plans. This system for establishing a regional approach to air pollution control is outlined in Figure 1.

HEW DESIGNATES AIR QUALITY CONTROL REGIONS.
HEW DEVELOPS AND PUBLISHES AIR QUALITY CRITERIA BASED ON SCIENTIFIC EVIDENCE OF AIR POLLUTION EFFECTS.
HEW PREPARES AND PUBLISHES REPORTS ON AVAILABLE CONTROL TECHNIQUES
90 DAYS
STATES INDICATE THEIR INTENT TO SET STANDARDS.
(PUBLIC HEARINGS)
180 DAYS
STATES SET AIR QUALITY STANDARDS FOR THE AIR QUALITY CONTROL REGIONS.
180 DAYS
STATES ESTABLISH COMPREHENSIVE PLANS FOR IMPLEMENTING AIR QUALITY STANDARDS.
STATES SUBMIT STANDARDS FOR HEW REVIEW.
STATES SUBMIT IMPLEMENTATION PLANS FOR HEW REVIEW.
STATES ACT TO CONTROL AIR POLLUTION IN ACCORDANCE WITH AIR QUALITY STANDARDS AND PLANS FOR IMPLEMENTATION.

FIGURE 1 - Flow Diagram for Action to Control Air Pollution on a Regional Basis, Under the Clean Air Act

DESIGNATION OF AIR QUALITY CONTROL REGIONS

Designation of an air quality control region is one of the first steps in the regional approach to air pollution control. Section 107 (a) (2) of the Clean Air Act as amended directs the Secretary, Department of Health, Education, and Welfare to make such designations. The portions of the section relevant to this discussion state:

> "...The Secretary, after consultation with appropriate State and local authorities shall...designate air quality control regions based on jurisdictional boundaries, urban-industrial concentrations, and other factors including atmospheric areas necessary to provide adequate implementation of air quality standards. The Secretary may... revise the designation of such regions...The Secretary shall immediately notify the Governor or Governors of the affected State or States of such designation."

Procedure For Designation of Regions

Figure 2 illustrates the procedures used by the National Air Pollution Control Administration for designating air quality control regions.

After evaluating relevant technical and urban factors, the National Air Pollution Control Administration publishes a proposed delineation of the region boundaries. At the same time NAPCA sets a time and place for a consultation meeting and distributes to State and local authorities a report of the evaluation study (such as this "Report for Consultation") which includes the boundary proposal. At the consultation meeting State and local authorities are encouraged to present fully their views and suggestions concerning the proposed boundaries of the region. Interested parties who do not have official status may submit comments in written form for

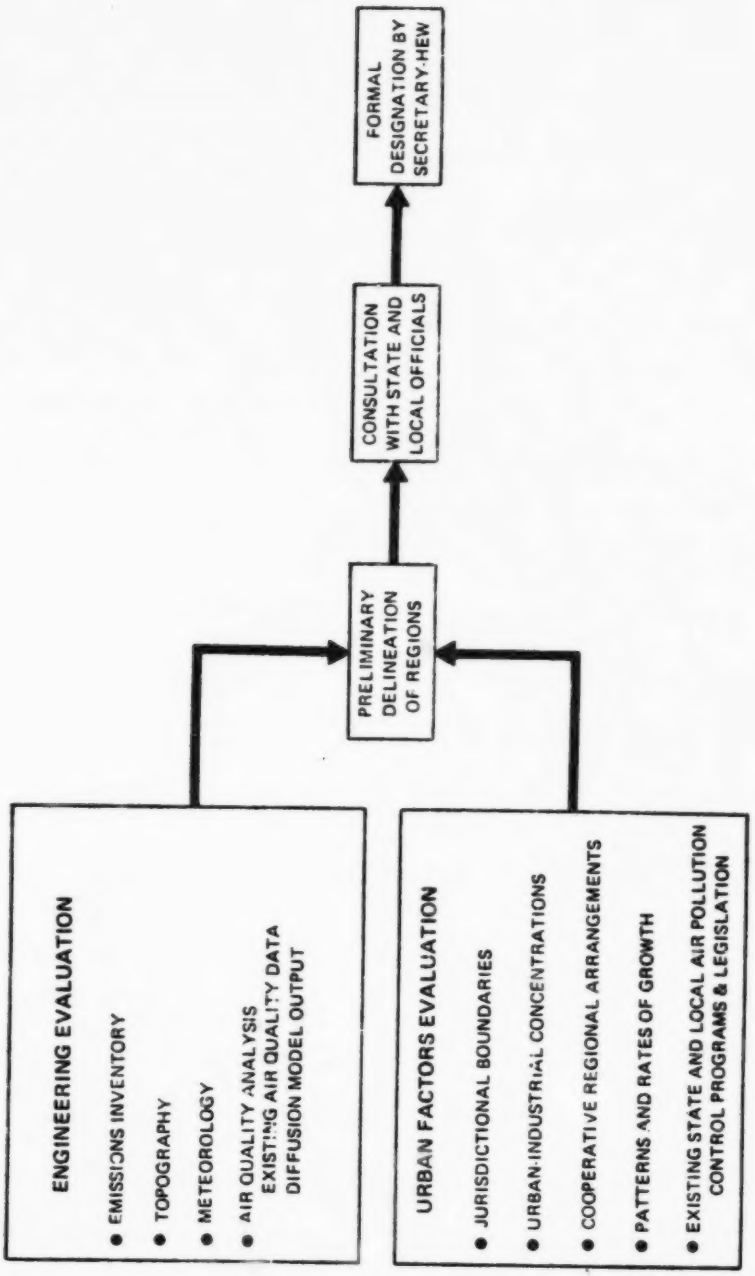
FORMAL DESIGNATION BY SECRETARY HEW
CONSULTATION WITH STATE AND LOCAL OFFICIALS
PRELIMINARY DELINEATION OF REGIONS
ENGINEERING EVALUATION
• EMISSIONS INVENTORY
• TOPOGRAPHY
• METEOROLOGY
• AIR QUALITY ANALYSIS EXISTING AIR QUALITY DATA DIFFUSION MODEL OUTPUT
URBAN FACTORS EVALUATION
• JURISDICTIONAL BOUNDARIES
• URBAN-INDUSTRIAL CONCENTRATIONS
• COOPERATIVE REGIONAL ARRANGEMENTS
• PATTERNS AND RATES OF GROWTH
• EXISTING STATE AND LOCAL AIR POLLUTION CONTROL PROGRAMS & LEGISLATION

FIGURE 2 - Flow Diagram for the Designation of Air Quality Control Regions

the record. After careful review of all suggestions and opinions submitted for the record by interested parties, the Secretary of Health, Education, and Welfare makes a formal designation of the region boundaries and notifies the Governors of the designation.

The Size of a Region

As stipulated in Section 107 (a) (2), the designation of air quality control regions should be based on "jurisdictional boundaries, urban-industrial concentrations, and other factors including atmospheric areas necessary to provide adequate implementation of air quality standards." This language suggests a number of objectives which are important in determining how large an air quality control region should be. Basically, these objectives can be divided into three separate categories.

First, a region should be self-contained with respect to air pollution sources and receptors. In other words, a region should include most of the important sources in the area as well as most of the people and property affected by those sources. In this way, all the major elements of the regional problem will lie within one unified administrative jurisdiction. Unfortunately, since air pollutants can travel long distances, it is impractical if not impossible to delineate regions which are completely self-contained. The air over a region will usually have at least trace amounts of

pollutants from external sources. During episodic conditions, such contributions from external sources may even reach significant levels. Conversely, air pollution generated within a region and transported out of it can affect external receptors to some degree. It would be impractical and inefficient to make all air quality control regions large enough to encompass these low-level trace effects. The geographic extent of trace effects overestimates the true problem area which should be the focus of air pollution control efforts. Thus, the first objective, that a region be self-contained, becomes a question of relative magnitude and frequency. The dividing line between "important influence" and "trace effect" will be a matter of judgment. The judgment should be based on estimates of the impact a source has upon a region, and the level of pollution to which receptors are subjected. In this respect, annual and seasonal data on pollutant emissions and ambient air concentrations are a better measure of relative influence than short term data on episodic conditions.

The second general objective requires that region boundaries be designed to meet not only present conditions but also future conditions. In other words, the region should include areas where industrial and residential expansion are likely to create air pollution problems in the foreseeable future. This objective requires careful consideration of existing metropolitan development plans, expected population growth, and projected industrial expansion. Such considerations should result in the designation of regions which will contain the sources and receptors of regional

air pollution for a number of years to come. Of course, region boundaries need not be permanently fixed, once designated. Boundaries should be reviewed periodically and altered when changing conditions warrant readjustment.

The third objective is that region boundaries should be compatible with and even foster unified and cooperative governmental administration of the air resource throughout the region. Air pollution is a regional problem which often extends across several municipal, county, and even state boundaries. Clearly, the collaboration of several governmental jurisdictions is prerequisite to the solution of the problem. Therefore, the region should be delineated in a way which encourages regional cooperation among the various governmental bodies involved in air pollution control. In this regard, the existing pattern of governmental cooperation on the whole range of urban problems may become an important consideration. Certainly the pattern of cooperation among existing air pollution control programs is a relevant factor. In general, administrative considerations dictate that governmental jurisdictions should not be divided. Although it would be impractical to preserve State jurisdictions undivided, usually it is possible to preserve the unity of county governments by including or excluding them in their entirety. Occasionally, even this would be impractical due to a county's large size, wide variation in level of development, or striking topographical features.

To the extent that any two of the above three objectives lead to incompatible conclusions concerning region boundaries, the region

must represent a reasonable compromise. A region should represent the best way of satisfying the three objectives simultaneously.

As noted above, the evaluation of relevant technical factors and urban factors forms the basis of the boundary proposals published by NAPCA. The evaluation of technical factors is designed to indicate the location of pollution sources and the geographic extent of serious pollutant concentrations in the ambient air. Pollution sources are located by taking an inventory of emissions from power generation, industrial activities, space heating, waste disposal, and other pollution generators. The transport and distribution of pollutants in the ambient air are analyzed on the basis of measured air quality data, the location of emissions, meteorological data, and topographic information. A mathematical diffusion model which predicts ambient pollution concentrations from information on emissions and meteorology can be used in areas where irregular topographical features would not invalidate the theoretical model. As a whole, the technical study indicates how large the air quality control region must be in order to encompass most pollution sources and most people and property affected by those sources.

The study of urban factors encompasses a different set of considerations. It reviews existing governmental jurisdictions, the location of urban and industrial concentrations, expected patterns of urban growth, cooperative regional arrangements, existing State and local air pollution control programs, and other associated factors. As a whole, the study of urban factors is

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designed to indicate how large a region must be in orcer to encompass expected regional growth and to encourage cooperation among political units in controlling air pollution.

The body of this report contains a proposal for the boundaries of the Atlanta Intrastate Air Quality Contrcl Region and outlines the evaluation of technical and urban factors which was the basis of the proposal. The report is intended to serve as the background dccument for the consultation with appropriate State and local authorities.

EVALUATION OF URBAN FACTORS

In determining the boundaries of an air quality control region, urban factors are of importance for it is the concentration of population and work in urban centers that at once creates many sources of air pollution and exposes both high investments in property and more important, large numbers of people to their effects.

In this discussion of the Atlanta area, the geography of the region is first considered since the location and physical characteristics of an area can significantly affect the scale and direction of urban growth.

There are then considered the present population and economic activity pattern of the region, the probable future growth of population and shifts in activity pattern of the labor force, and the likely physical directions and concentrations of that growth. As in other planning activities, the shape of the future to the extent that it can be foreseen has an important bearing on present decisions with respect to the boundaries of the proposed air quality control region.

Finally, following an evaluation of technical factors requiring consideration, there are summarized the status of existing air pollution abatement and control efforts in the State and region and the jurisdictional scope of established regional governmental organizations dealing with regionwide matters. The latter is of significance because the Clean Air Act has an objective, regional air quality control programs based on cooperative efforts among affected political jurisdictions.

GEOGRAPHY OF THE REGION

The Atlanta area is located in the northwestern section of Georgia where mountains and ridges of the Appalachian Range give way to a gently rolling plateau with elevations of around 900-1,000 feet above sea level. Within the area, only the isolated outcrops of historic Kennesaw Mountain and granite-crowned Stone Mountain rise substantially above this level.

North and northeast of the Atlanta area are the Blue Ridge Mountains which stretch down from North Carolina into Georgia. To the northwest and west lie a series of ridges which slant southwesterly across Georgia from Tennessee toward Alabama. The ridges, which rise to peak elevations of 1,500-2,000 feet, are broken by gaps, and one famous succession of these gaps establishes a direct route from the Tennessee border into Georgia. East and south of the Atlanta area, the plateau merges into a gradually descending terrain with no major obstructions barring the way to the Savannah River, the Atlantic Ocean, and Georgia's boundary with Florida.

The Atlanta area is at the headwaters of numerous river systems fed by literally hundreds of smaller streams. The Chattahoochee River, flowing through Metropolitan Atlanta and dammed to form Lake Sidney Lanier northeast of the City, is the major river of the area. It is, however, not navigable, so that Atlanta, surrounded by streams and rivers, is landlocked.

The City of Atlanta owes its origin to geography. In 1837, as the U.S. Army Corps of Engineers considered a railroad route from Chattanooga, Tennessee, to the Chattahoochee River in

Georgia, the engineering advantages of the gaps in the Appalachian ridges of northwest Georgia are likely to have weighed heavily in the decision to build the line. On the Chattahoochee River, the terminus chosen was a point on the southeastern bank of the River, now in the heart of the City of Atlanta. The City, originated as a settlement of construction workers building the end of a railroad line, might have vanished on completion of its construction. But in 1845, it was converted into an important link of a southern overland route to the Atlantic Ocean, when another railroad from the port of Augusta on the Savannah River came to meet the terminus of the line from Tennessee.

Well before the Civil War, therefore, Atlanta was a transportation center. This locationally-influenced transportation advantage has been greatly augmented in recent times, by highway and airline routes crisscrossing in the area. Today, Atlanta is the hub of three Interstate highways (I-20, I-75, and I-85) and nine scheduled airlines.

The Atlanta area's water resources, combined with its location in a cotton plantation region, led to the establishment in the 19th century of textile mills at scattered sites throughout the area (for example, in Canton, Cherokee County; Griffin, Spalding County; as well as in Atlanta itself).

Because no major physical obstructions like high mountains or a wide river existed within a wide radius of the City of Atlanta, it early developed and continued a roughly circular

spatial outline rather than the elongated shapes of valley cities or the semi-circular patterns of cities along major rivers and at ports.

More recently, Atlanta's central location in the southeast section of the Nation, its transportation advantages, and an equable climate have brought both service as well as newer manufacturing industries into the area. Today, Atlanta serves a seven-State market area as its largest city. 1/

PRESENT POPULATION AND INDUSTRIAL PATTERN OF REGION

There is no readily apparent boundary line dividing urban from nonurban areas in the Atlanta region. Even the large Atlanta Standard Metropolitan Statistical Area of five counties (Fulton, Cobb, Clayton, DeKalb, and Gwinnett), covering an expanse of 1,728 square miles, does not give way neatly to nonurban areas.

Metropolitan Atlanta is ringed by counties with populations dominantly engaged in nonfarm occupations, whether or not their place of residence is classified as a farm. Although the proportion of land area in farms is generally higher in the outlying counties than in the counties of Metropolitan Atlanta, the ratio of nonfarm income earned by farmers is not much less in the former than in the latter (Table I).

1/ Georgia, Alabama, Florida, Mississippi, North Carolina, South Carolina, and Tennessee

Table I

Farm Area and Nonfarm Income of Farm-Operator Households, 1964

Counties	Percent, Land Area in Farms	Percent, Income Farm-Operator Households From Nonfarm Sources
Atlanta SMSA		
Clayton	23.3	95.4
Cobb	24.7	91.7
DeKalb	14.3	78.5
Fulton	26.0	87.1
Gwinnett	33.7	86.6
Adjoining Counties		
Barrow	58.0	87.7
Bartow	50.2	82.6
Carroll	48.5	85.4
Cherokee	36.1	92.1
Coweta	51.2	84.7
Douglas	25.6	89.1
Fayette	46.4	91.9
Forsyth	58.7	85.8
Hall	45.9	84.7
Henry	50.7	87.2
Paulding	31.3	86.4
Rockdale	53.0	82.1
Spalding	55.6	84.0
Walton	58.8	81.7

Source: U.S. Department of Commerce, Bureau of the Census, County and City Data Book, 1967.

As Table II shows, the five-county Metropolitan Area has an estimated 1969 population of 1,302,000, but 14 adjoining counties contain another 385,000 persons, roughly 30 percent of the five-county total. If population density on a county-wide area basis is used as a measure of urbanization, outlying Spalding and Hall Counties are more urban than Gwinnett County within the five-county Metropolitan Area, and Rockdale and Douglas Counties are not essentially less urban than Gwinnett (Figure 3).

A better idea of the present urban extension of Atlanta as depicted by population can be obtained by examining Figure 4 in conjunction with Figure 5. The former, prepared by the Atlanta Region Metropolitan Planning Commission (ARMPC) using 1967 population estimates, shows Metropolitan Atlanta with a densely populated core around which there is a ring of somewhat lesser density. From this ring, there projects out well-defined spokes of similar density to the northwest and south, and less well-defined extensions to the north, northeast, southwest, and west. In between the projecting spokes and at the edges of Metropolitan Atlanta, densities are lower. But, as Figure 5 shows, at certain points just outside these relatively sparsely settled areas, there are not only sizable urban concentrations but they lie on main highways radiating out from Atlanta. Some of these highways are also those along which there exist the spokes of relatively heavy densities outward from the City core. Thus, although there are no continuous corridors of urban-scale settlement, the physical setting for such a development exists.

Table II

Estimated Population of Atlanta Area Counties, 1969

Counties	Total (thousands)
Atlanta SMSA, total	(1,302.0)
Clayton County	82.3
Cobb County	181.7
DeKalb County	364.7
Fulton County	609.3
Gwinnett County	64.0
Adjoining Counties, total	(384.8)
Barrow	15.9
Bartow	35.0
Carroll	43.5
Cherokee	27.9
Coweta	31.6
Douglas	24.6
Fayette	9.4
Forsyth	16.1
Hall	56.9
Henry	25.3
Paulding	16.6
Rockdale	16.1
Spalding	41.5
Walton	24.4

Sources:

Estimates for City of Atlanta and Atlanta Metropolitan Area Counties are those of Atlanta Region Metropolitan Planning Commission, Population and Housing as of April 1, 1969. Estimates for other nearby Counties are those of Rand McNally & Company as of January 1, 1969, Commercial Atlas and Marketing Guide, 100th edition, 1969.

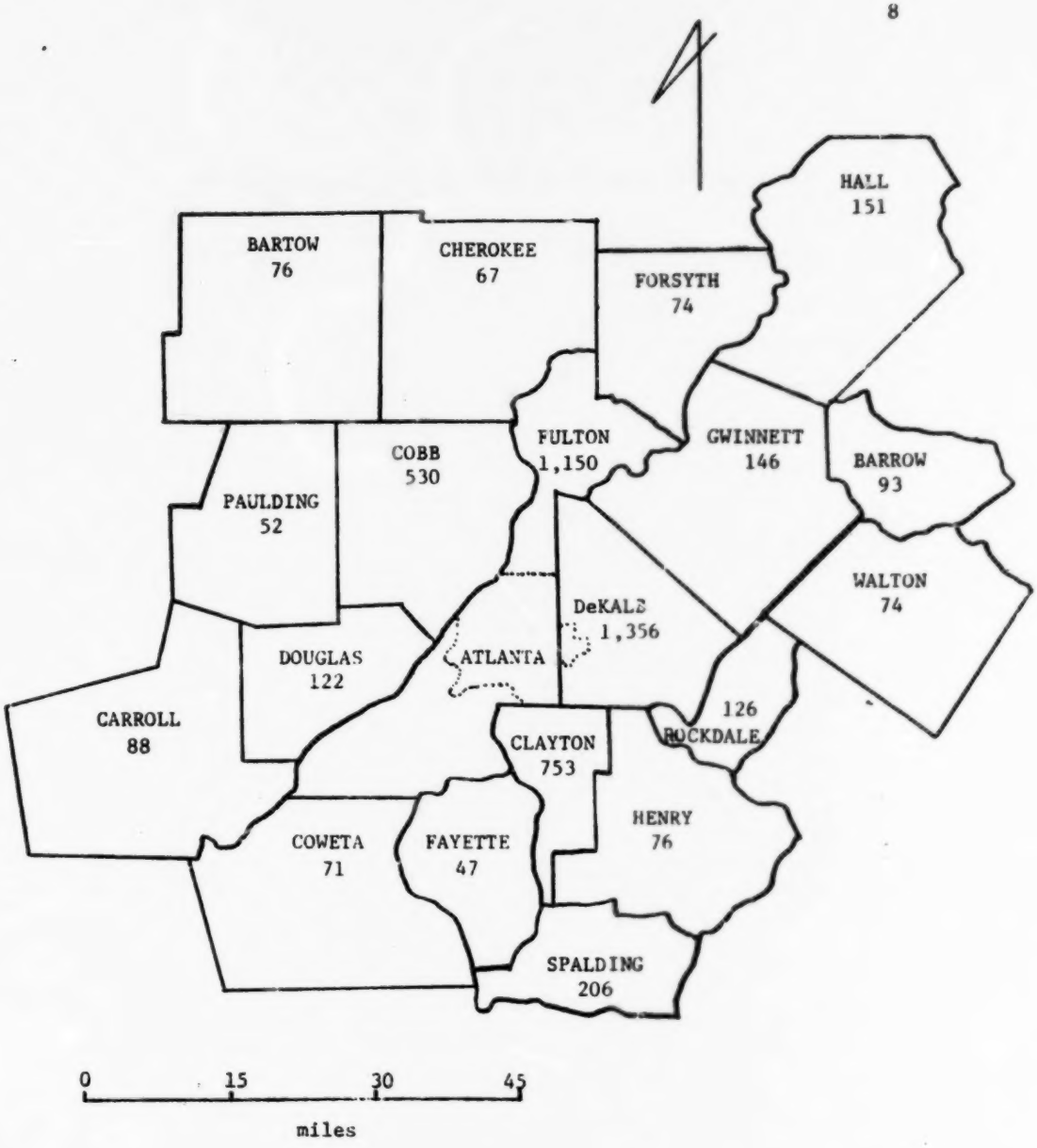

FIGURE 3 - Population Per Square Mile of Atlanta Area Counties, 1969

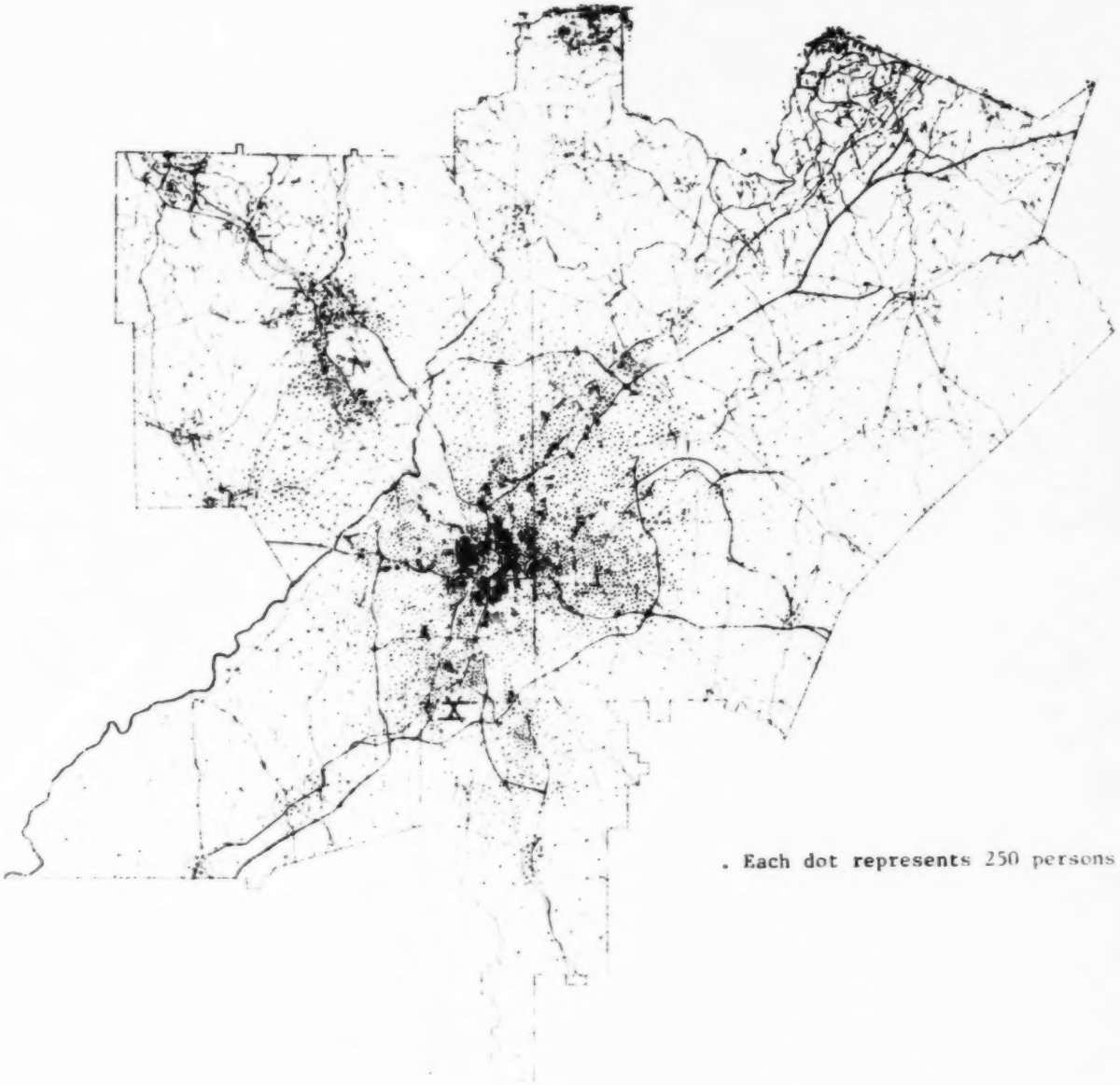

FIGURE 4 - Estimated Metropolitan Atlanta Population Density, 1967

Source: Atlanta Region Metropolitan Planning Commission.

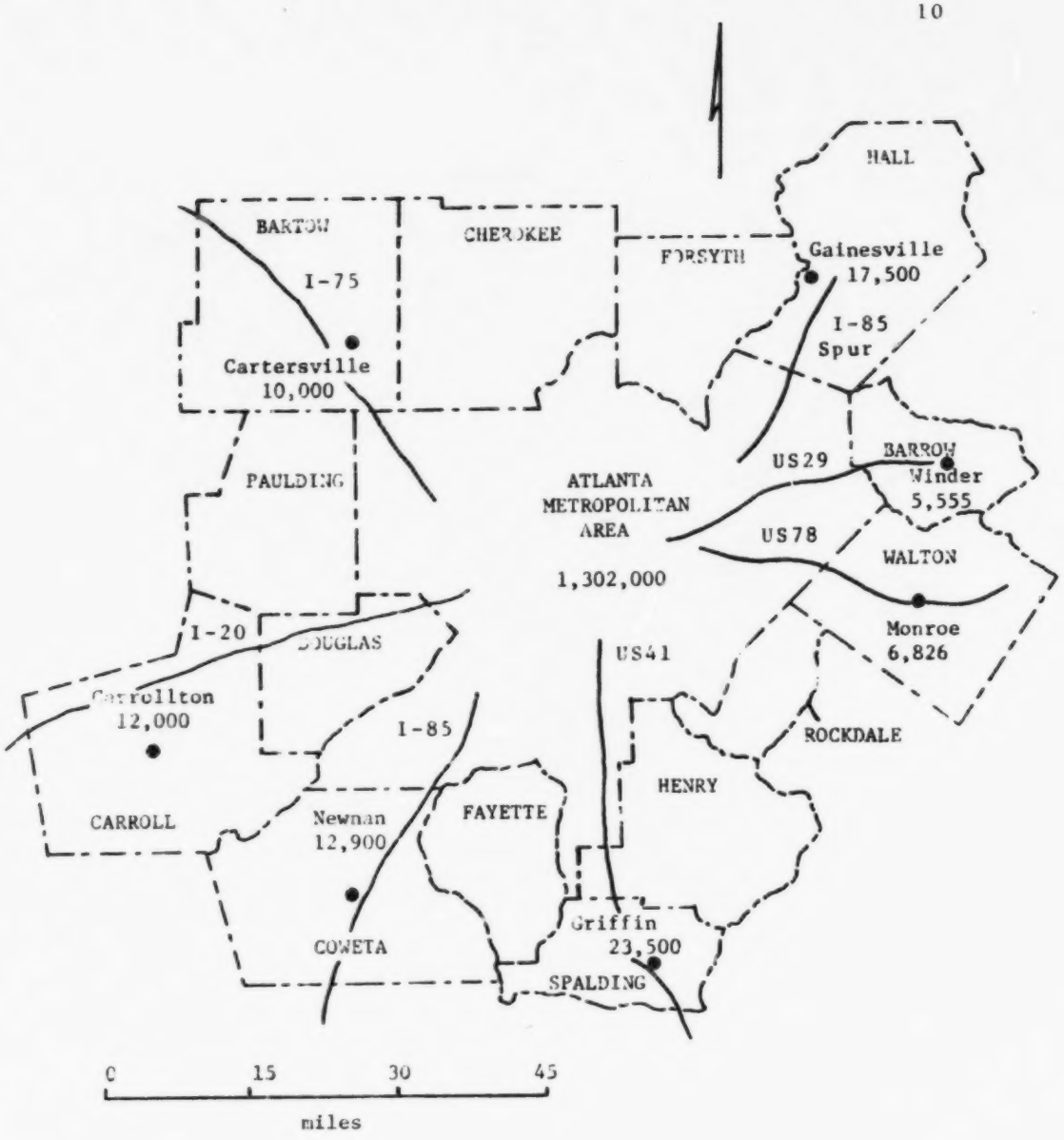

FIGURE 5 - Population of Principal Cities of Atlanta Area and Their Location in Relation to Highway Pattern of Area, 1969

The industrial pattern of the 19-county Atlanta area, as measured by manufacturing employment, like the population pattern, is one of a primary concentration in the five-county Metropolitan Area with significant smaller concentrations in the tier of adjoining counties. As Table III shows, manufacturing employment in the Metropolitan Area counties now totals 143,840, but the adjoining counties add another 50,583, about 35 percent of the Metropolitan Area total.

As may be expected, most of the manufacturing employment in the outer tier counties is concentrated in their largest cities, notably in Gainesville in Hall County; Winder, Barrow County; Monroe, Walton County; Conyers, Rockdale County; Griffin, Spalding County; Newnan, Coweta County; Carrollton, Carroll County; Cartersville, Bartow County; and Canton, Cherokee County (Figure 6). Although textile mills and apparel manufacturing are of major importance in most of these cities, there is also substantial diversification. For example, aircraft engine nacelle manufacturing in Winder; chemicals and plastics in Cartersville; wire, cable, and auto body parts in Carrollton; aluminum extrusions and pressure tanks in Newnan; broiler production in Gainesville; and bus and truck bodies in Griffin. Some of the plants are very large -- a textile mill in Griffin has a total employment of over 2,000; a wire and cable manufacturer in Carollton has 1,400 employees; and a broiler producer in Gainesville employs over 900 persons. At least 15 plants in the outer tier counties now employ 400 workers or more.

Table III

Manufacturing Employment, 1969

Counties	Total Employment
Atlanta SMSA, total	(143,840)
Clayton	3,634
Cobb	28,262
DeKalb	15,916
Fulton	91,945
Gwinnett	4,083
Adjoining Counties, total	(50,583)
Barrow	2,519
Bartow	5,428
Carroll	7,978
Cherokee	2,875
Coweta	5,354
Douglas	630
Fayette	752
Forsyth	1,074
Hall	9,809
Henry	1,256
Paulding	450
Rockdale	2,264
Spalding	6,829
Walton	3,365

Source: Georgia Manufacturing Directory, 1969

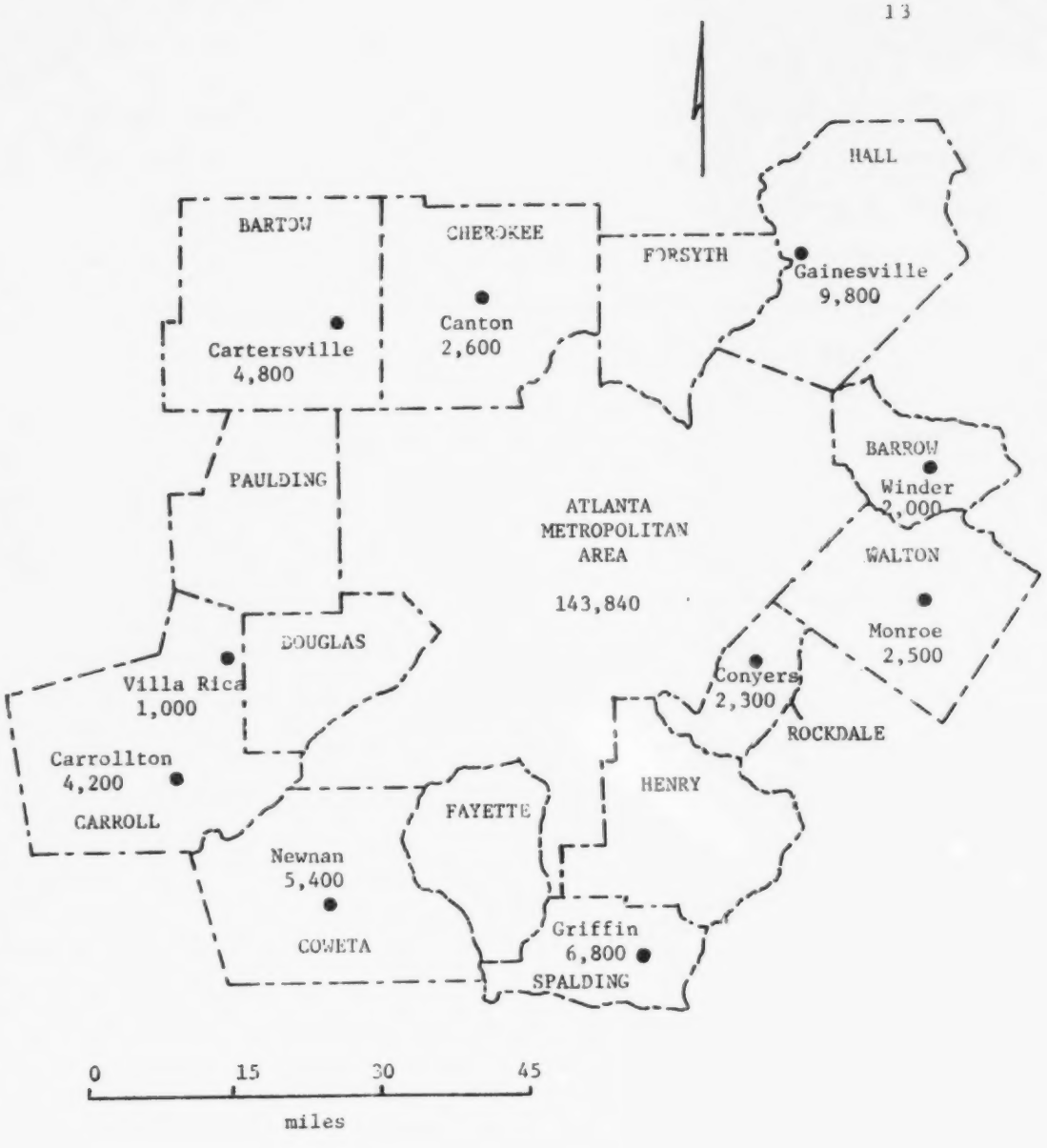

FIGURE 6 - Manufacturing Employment of Atlanta Metropolitan Area and of Principal Cities in Adjoining Counties, 1969

The outstanding characteristic of industry in Metropolitan Atlanta is the heavy dominance of transportation equipment which currently accounts for nearly 30 percent of total manufacturing employment (Figure 7). This work includes virtually no manufacturing as such. It consists almost entirely of the assembly of parts manufactured elsewhere into vehicles by three firms at four locations. One plant is a huge aircraft assembly complex now employing an annual average of some 23,000 persons. Three others are automobile and truck assembly plants having a total of over 10,000 employees.

The remainder of Atlanta manufacturing is broadly diversified except for relatively larger shares of employment in food processing, textile and apparel manufacture, and metals and machinery. The third of these categories is now of greater relative importance than either of the first two. Manufacture of electrical equipment, pressure tanks, and other products requiring high quality steels has been stimulated by the availability in Atlanta of electric furnace steels produced at the City's one steel mill. Chemicals manufacture has been and continues to be of relatively minor significance.

The extent to which manufacturing in Metropolitan Atlanta is linked to that of the smaller urban centers in the adjoining counties is difficult to establish. That there are connections beyond mere reliance on Atlanta as a service and transportation center is certain. For example, the aircraft engine nacelles

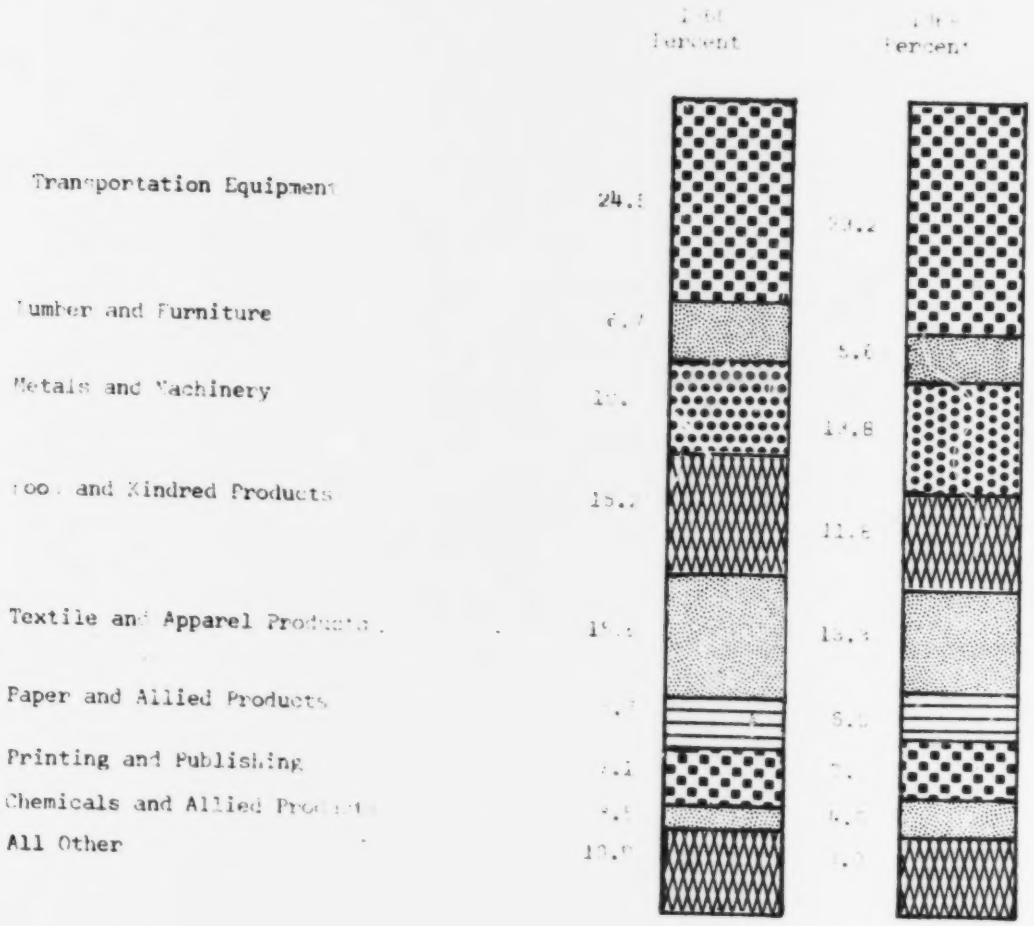

FIGURE [illegible] - Distribution of Metropolitan Atlanta Manufacturing Employment, 1950 and 1968

Source of data. Georgia Department of Labor figures cited by Atlanta Chamber of Commerce.

made in Winder are sent for final assembly to the aircraft plant in Marietta. Atlanta produced steel is no doubt utilized in products ranging from auto body parts and containers to mobile homes made in plants in adjoining counties. The large aircraft assembly plant draws heavily on workers resident in counties outside Metropolitan Atlanta but who commute to work at the plant. Some 3,300 employees of this category came from Bartow, Carroll, Cherokee, Douglas, Forsyth, and Hall Counties. 2/

On the other hand, the still heavy dominance of the textile and apparel industries in the smaller urban centers of the outlying counties, with firms oriented to national markets, indicate that those centers are far from being mere satellites of their large neighbor at this time.

PROBABLE SCALE OF POPULATION AND ECONOMIC GROWTH

ARMPC currently estimates that in the nine-year period, 1960-69, 3/ Metropolitan Atlanta population increased at an annual rate of 2.7 percent. Continued growth at this rate would imply a Metropolitan Atlanta population in 1983 -- the target year used for planning purposes by ARMPC -- of about 1,890,000. Compared to the decade of the 50's when Metropolitan Atlanta added population

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2/ Press release, Newsbureau, Lockheed-Georgia Company, October 23, 1969.

3/ Atlanta Standard Metropolitan Statistical Area Population and Housing, April 1, 1969.

at an annual rate of 3.4 percent, the ARMPC estimate indicates that growth has now moderated.

As to the period ahead, there is a considerable divergence in estimates. The National Planning Association ventures a rate of 2.8 percent per year while the Bureau of the Census suggests lower alternate annual rates of 2.5 and 2.1 percent. 4/ Use of these rates results in 1983 estimated population totals for Metropolitan Atlanta of 1,917,000, 1,840,000 and 1,742,000, respectively.

The counties adjoining Metropolitan Atlanta have also grown vigorously during the 60's. Bureau of the Census estimates of population changes between 1960 and 1966 5/ indicate an average growth of these counties like that estimated for Metropolitan Atlanta during 1960-69, i.e., in the range of 2.7 percent per year. Growth was especially marked in Rockdale, Douglas, Henry, and Forsyth Counties. If growth in the outlying counties continues at the 1960-66 pace, they could have a 1983 population in excess of 560,000, three-fifths of whom resided in Hall, Carroll, Rockdale, Spalding, Bartow, and Henry Counties. The Atlanta area, including these counties, would then have a total population of 2,300,000 to 2,500,000 in 1983, compared to an estimated 1,690,000 today.

4/ National Planning Association, Looking Ahead, Vol. 17, No. 4, May, 1969; U.S. Department of Commerce, Bureau of the Census, Projections of the Population of Metropolitan Areas: 1975, Series P-25, No. 415, January 31, 1969. The difference in the two census estimates is due mainly to different assumptions with respect to national fertility rates.

5/ U.S. Department of Commerce, Bureau of the Census, Estimates of the Population of Counties and Metropolitan Areas, July 1, 1966, A Summary Report, Series P-25, No. 427, July 31, 1969

Whether population growth of this magnitude occurs in the Atlanta area is in large part dependent on its economic growth prospects. This is so because in-migration responding to the pull of job opportunities accounts for a major share of population increases in the most rapidly growing urban areas.

Recent economic expansion of Metropolitan Atlanta has been impressive. The U.S. Department of Commerce estimates that total personal income in the Atlanta Metropolitan area increased 89 percent between 1959 and 1967, compared to an increase of 63 percent in all metropolitan areas in the United States. Despite high population growth, therefore, per capita personal income in Atlanta also grew faster than in metropolitan areas as a whole (Table IV).

This upsurge has not been due to any basic shifts in Atlanta's economic structure which is that of a regional rather than a national center. The essentially regional and local service activities of government; contract construction, transportation, communication and public utilities; wholesale and retail trade; finance, insurance and real estate; and consumer and business services contributed roughly two-thirds of Atlanta's total personal income in 1967 as well as in 1959. Manufacturing provided only about 20 percent of the total in both years (Table V).

It seems reasonable to assume, therefore, that economic expansion of Metropolitan Atlanta, will in the future as well as the past, depend more on demands for its services as a regional center than on national market demands for goods provided by its

Table IV

Growth in Personal Income and Per Capita Personal Income Atlanta Metropolitan Area * Compared to all Metropolitan Areas, 1959-67

	Personal Income			Per Capita Personal Income		
	1959 (Millions of Dollars)	1967	Percent Increase, 1959-67	1959 (Dollars)	1967	Percent Increase, 1959-67
Atlanta Metropolitan Area *	2,371	4,479	89.0	2,310	3,371	46.0
All Metropolitan Areas	290,062	473,246	63.0	2,448	3,511	43.0

* Standard Metropolitan Statistical Area Counties of Fulton, DeKalb, Cobb, Clayton and Gwinnett.

Source: U.S. Department of Commerce, "Metropolitan Area Income in 1967," Survey of Current Business, May, 1969, pp. 13-33.

Table V

Sources of Personal Income in the Atlanta Metropolitan Area, * 1959 and 1967

(Percent of total personal income)

	1959	1967
Total Personal income	100.0	100.0
Property income and transfer payments, less personal contributions for social insurance	16.1	14.3
Total earnings	83.9	85.7
Farm earnings	.3	N
Total nonfarm earnings	83.6	85.7
Government earnings	9.9	10.5
Total Federal	5.6	5.9
Federal civilian	4.4	4.9
Military	1.2	1.0
State and local	4.3	4.6
Private nonfarm earnings	73.7	75.2
Manufacturing	19.8	20.0
Mining	.1	.1
Contract construction	4.9	5.7
Transportation, Communication and Pub. util.	9.7	9.9
Wholesale and retail trade	20.9	20.6
Finance, insurance, and real estate	6.6	6.5
Services	11.6	12.3
Other	.1	.1

* Includes Counties of Fulton, DeKalb, Cobb, Clayton and Gwinnett.

N - Negligible

Source: Unpublished analysis obtained from the U.S. Department of Commerce.

industry. These will include banking and financial services, facilitated by Atlanta's being a Federal Reserve District city; Federal and State government services; as well as wholesale, trade, transportation, and communications.

In the 1959-67 period, strong economic growth in the seven Southeastern States served by Metropolitan Atlanta provided impetus for growth of the City. Except in the case of Alabama, this group of states grew faster than the United States as a whole, at annual rates ranging from 7.1 percent in Mississippi and Tennessee to about 8 percent in Florida, Georgia, and the Carolinas. As a result, the gap between the lower per capita incomes in these States and the U.S. average, was reduced very considerably during the period. This rise in per capita incomes was as significant for Atlanta's progress as the expansion in total income (Table VI).

In the period ahead into the mid-70's, above average growth of these States, with strong growth in Florida and Georgia, is predicted by the National Planning Association. 6/ However, as in the case of the National economy as a whole, annual rates of growth of these States are expected to be lower and to vary from around 4.5 percent to just under 6 percent instead of the 7-8 percent range of the 1959-67 period. Should this happen, Metropolitan Atlanta's population and economic activity may also exhibit lower growth rates in the future.

6/ Looking Ahead, op. cit.

Table VI

Growth in Personal Income, Seven Southeastern States and in the United States, 1959-1967

	Per Capita Personal Income Ratio, State to U.S. as whole.		Total Personal Income	
	1959	1967	Percent Increase, 1959-67	Annual Percentage Rate of Growth, 1959-67
Alabama	67.8	68.5	63.1	6.3
Florida	89.6	90.3	83.7	7.3
Georgia	74.5	80.4	84.2	8.0
Mississippi	55.7	60.0	73.1	7.1
North Carolina	69.9	77.2	82.2	7.8
South Carolina	61.7	70.0	83.7	7.9
Tennessee	70.9	75.8	72.7	7.1
United States	100.0	100.0	64.1	6.4

Source: Computed from data in U.S. Department of Commerce, Survey of Current Business, August, 1968.

PROBABLE DIRECTIONS OF PHYSICAL GROWTH

The population projections discussed above for Metropolitan Atlanta will require development accommodating the residential, commercial, and occupational needs of a minimum of 33 percent to a maximum of 48 percent more people by the ARMPC planning target year of 1983. In addition, the adjoining outer tier counties are likely to require development for a roughly similar proportionate addition to their population. What does this portend for the directions of physical growth in the Atlanta area?

At the present time, a massive urban renewal program is well underway toward concentrating business facilities in 2,600 acres of Atlanta's central business district.

However, according to ARMPC, recent residential development in Metropolitan Atlanta has proceeded outward from the central core in all directions, with growth especially strong north and northeast of the City (Figure 8). This centrifugal tendency, attributed by a 1964 ARMPC study 7/ to the extension of public water systems into rural areas of Clayton, Cobb, and Gwinnett Counties, was characterized by the study as "scattered and haphazard suburban development" inconsistent with a "compact and serviceable pattern of growth". In a recent planning document 8/

7/ Open Land, Regional Problems and Opportunities, June, 1964.

8/ Regional Improvements Program, 1969-1973, March, 1969.

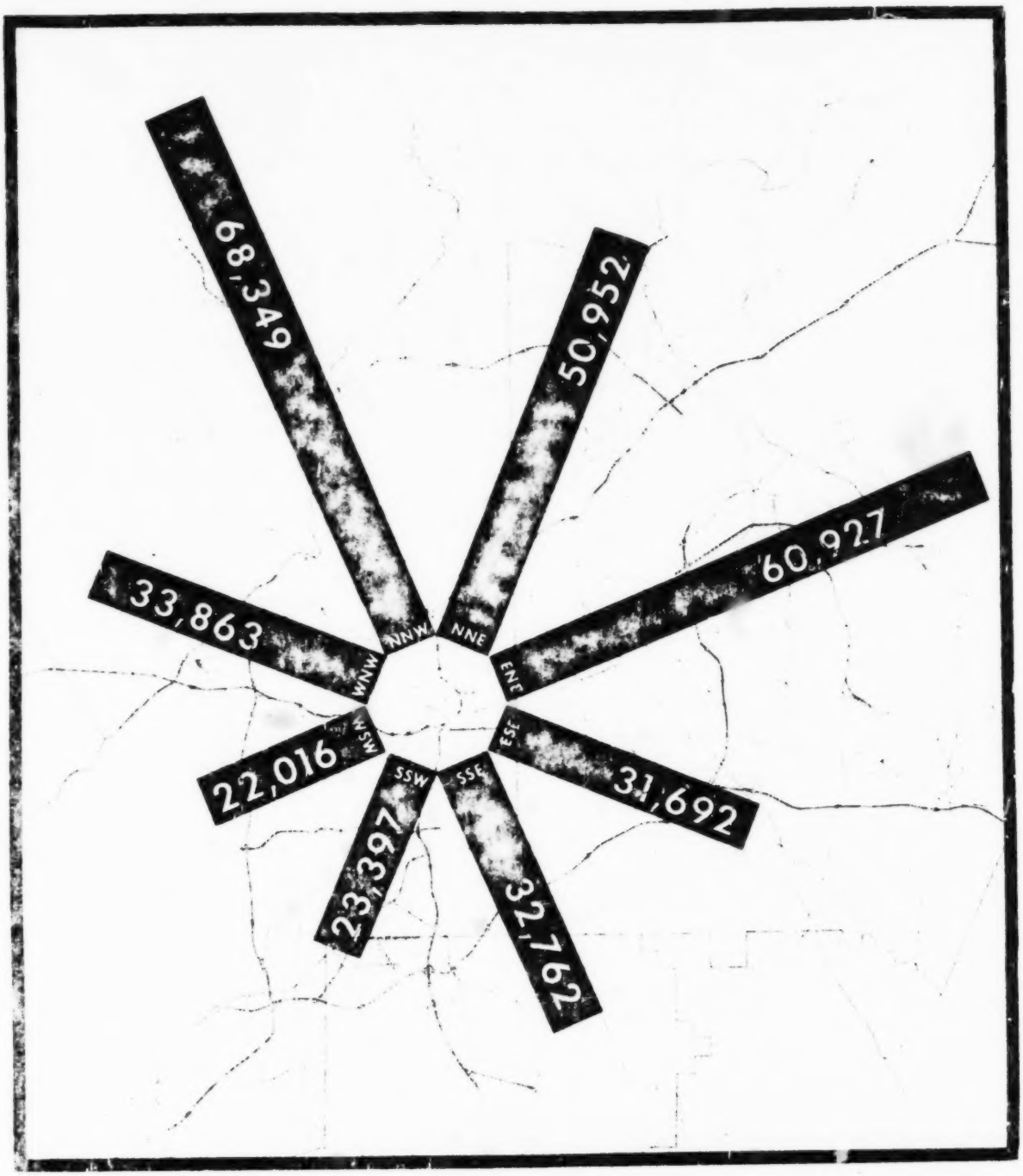

FIGURE 8 - Directions of Metropolitan Atlanta Estimated Population Growth 1960-1969 (Bars show population volume and not density of Settlement)

Source: Atlanta Region Metropolitan Planning Commission.

ARMPC, therefore, recommends that Metropolitan Atlanta limit outward development twenty years hence in 1968, to a largely contiguous area within the bounds of the five counties, except for extensions to the borders of Rockdale, Henry, and Douglas Counties.

Weighing in the balance against successful execution of this recommendation are the actual trends of centrifugal growth which are encouraged by the radial pattern of the interstate highways and unconfined by beltways outside the already developed area (Figure 9). In addition to this outward push, there could also be strong pulls from expanding urban areas in the adjoining counties, for example by Cartersville via the Smyrna-Marietta-Kennesaw-Acworth corridor; by Gainesville via the Norcross-Suwanee-Buford corridor; or by Griffin via Jonesboro. Finally, development into Henry County is certain to occur if it is selected for location of a second major airport for the Atlanta area.

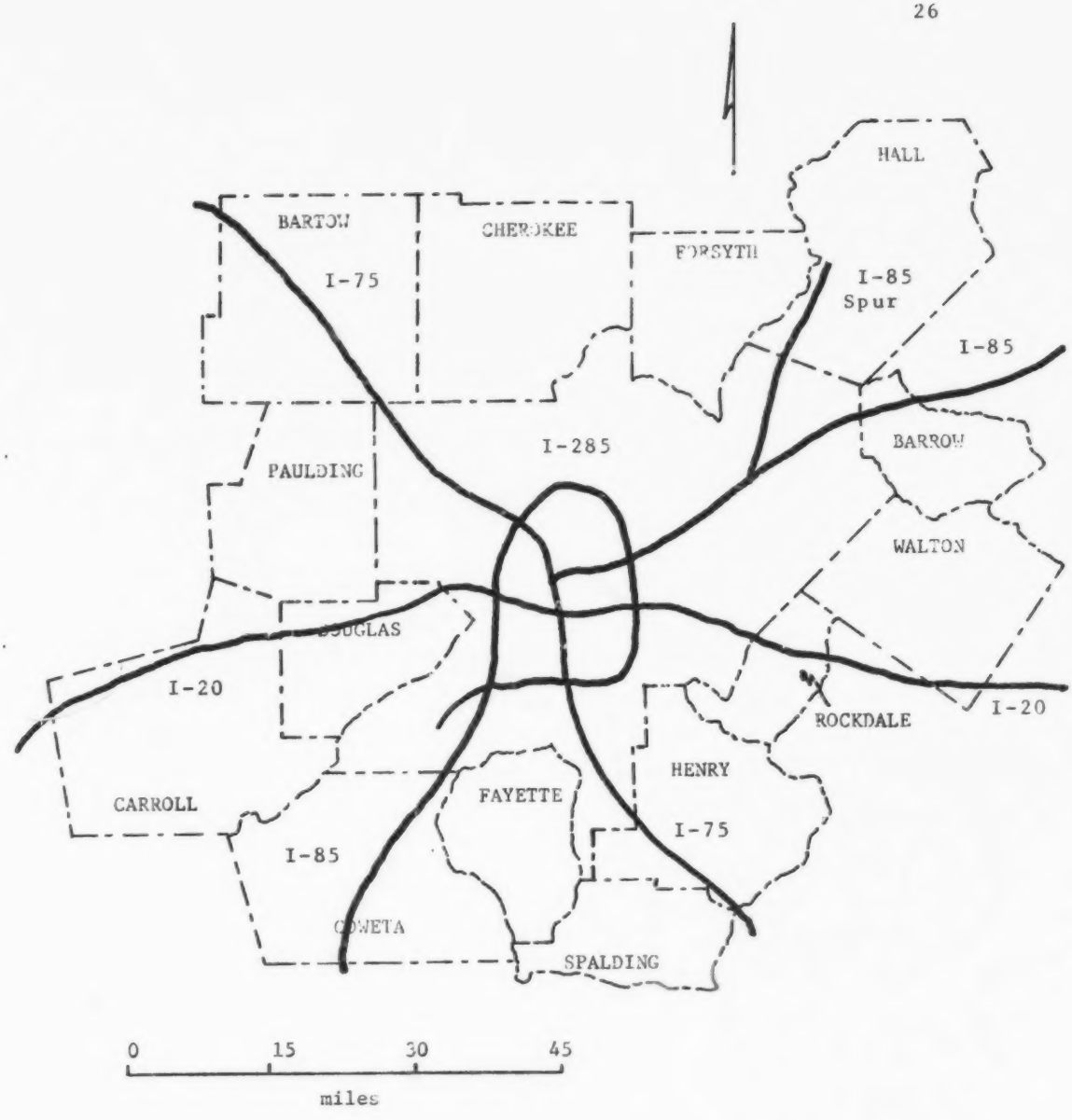

FIGURE 9 - Sketch of National Interstate Highways — Completed, Under Construction, and Proposed in Atlanta Area, 1969

EVALUATION OF TECHNICAL FACTORS

The technical factors of importance in considering the boundaries of a proposed air quality region are: the total quantity of pollutants emitted, the geographic pattern of emission sources, and patterns of pollutant dispersion.

In the Atlanta area, information with respect to these factors was obtained from an emission inventory conducted by the National Air Pollution Control Administration (NAPCA), air quality monitoring data obtained locally, and a theoretical diffusion model developed from the inventory data.

THE EMISSION INVENTORY

The emission inventory, based on 1968 data, included the five-county Metropolitan Area of Atlanta (Fulton, DeKalb, Cobb, Clayton, and Gwinnett Counties) together with adjoining Henry and Douglas Counties. Pollution sources in other counties adjoining Metropolitan Atlanta were not included in the emission inventory, although their urban aspects were examined in the preceding section.

The NAPCA emission inventory, which considered nitrogen oxides, carbon monoxide, hydrocarbon as well as sulfur oxides and particulate matter, is available in a more complete form as a separate NAPCA publication. For the purpose of this report two major pollutants - sulfur oxides and total particulates - are considered as representative of pollution problems from sources other than the automobile. Nearly 90 percent of carbon

monoxide and hydrocarbon emissions in the Atlanta survey area result from the operation of road vehicles. Since motor vehicles are subject to nationwide uniform federal standards, carbon monoxide and hydrocarbon emissions were not used as a factor to select preliminary Region boundaries. On the other hand, 94 percent of sulfur oxides and 75 percent of particulates, are emitted from point sources and need to be considered.

The quantity of sulfur oxides and total particulates emitted in the Atlanta area was estimated individually for major point sources and areawide for all other sources by use of a survey technique developed by the Public Health Service. 9/ Major point sources included power plants, large industrial plants, central refuse burning installations, and airports. Area sources included space heating, smaller industrial plants, and refuse burning.

Emission estimates were derived by applying average emission factors 10/ to indicators of pollutant emissions such as production data and type of fuel burned. Because these factors are averages, the estimates for a particular point source may vary from actual emissions to the extent that its operating characteristics vary from the average. Estimates for a large

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9/ Public Health Service, Rapid Survey Technique for Estimating Community Air Pollution Emissions. Publication No. 999-AP-29, Environmental Health Series, U.S.D.H.E.W., Division of Air Pollution, Cincinnati, Ohio, 1966

10/ Public Health Service, Compilation of Air Pollutant Emission Factors. Publication No. 999-AP-42, Environmental Health Series, U.S.D.H.E.W., NAPCA, Durham, North Carolina.

number of sources, however, are likely to approximate actual conditions since their characteristics as a group would tend to be similar to those used in calculating the emission factors.

The point source estimates are combined with area-wide estimates to arrive at total estimated emissions in tons per year of each pollutant. These estimates are shown in Table VII. Note that coal-burning power plants contribute about 90 percent of sulfur oxide emissions, and nearly 50 percent of total particulate emissions. Figure 10 shows graphically the sources of each pollutant.

To determine the geographic distribution of these emissions, the study area was divided into grid zones (Figure 11). The estimated point and area source emissions were apportioned to their respective grid zones (Figure 12). Point source emissions by grid zones are shown in Table VIII. Area-wide pollutant estimates are shown in Table IX. Density variations among the grid zones are graphically represented in Figures 13 and 14. These figures indicate that the greatest emission densities occur in the City of Atlanta and its immediate vicinity.

In considering these data, patterns of fuel consumption in the emission study area should be kept in mind. Coal, oil, and natural gas are all used; natural gas provides the major energy source for all local requirements other than electric power production. In 1968, over 75 billion cubic feet of natural gas (about 3,000,000 tons coal equivalent) and 560 thousand barrels of oil (about 140,000 tons coal equivalent) were consumed in the

Table VII

Summary of Air Pollutant Emissions for the Atlanta Study Area, 1968 (Tons/Year)

Source Category	Sulfur Oxides	Particulates
Transportation	1,900	7,000
Road Vehicles	1,900	3,350
Other	--	3,650
Combustion of Fuels by Stationary Sources	66,250	23,750
Industry	1,900	900
Steam-Electric	62,750	22,000
Residential	1,150	500
Commercial	450	350
Refuse Disposal	850	11,050
Incineration	850	7,300
Open Burning	--	3,750
Industrial Process Emissions	50	4,900
Total Emissions	69,050	46,700

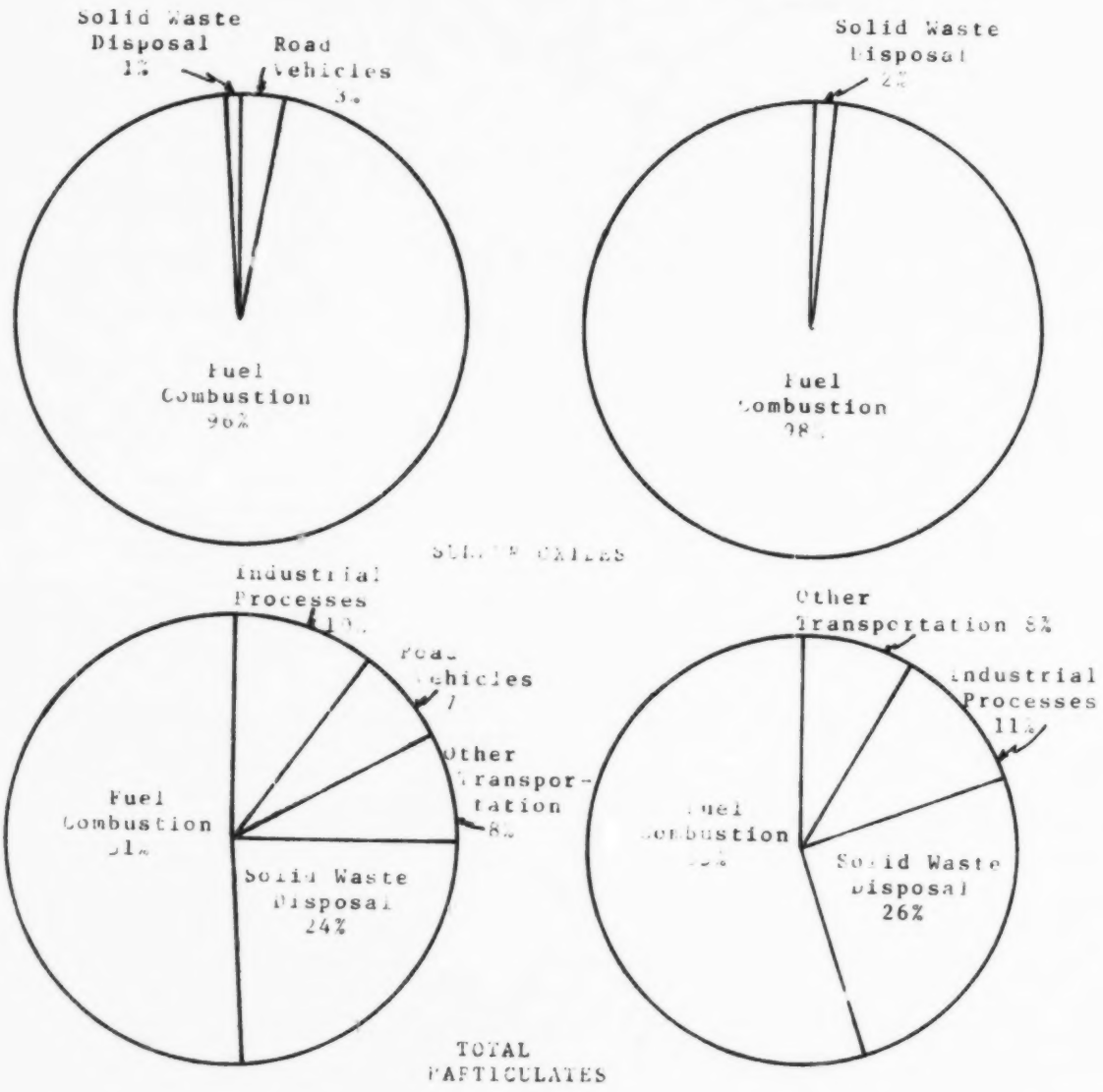
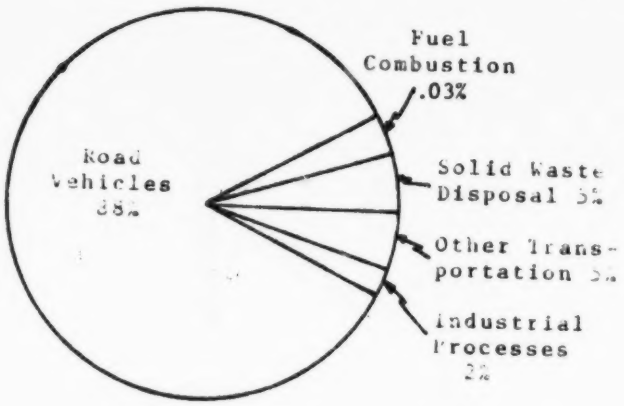
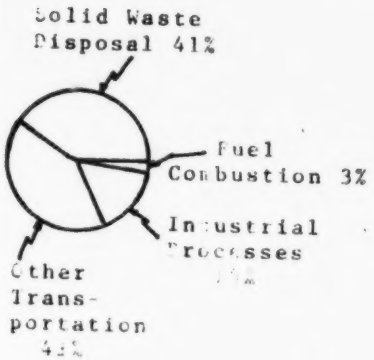


FIGURE 10 - Estimated Distribution of Emissions by Source, Inclusive and Exclusive of Road Vehicles, Atlanta Study Area, 1968

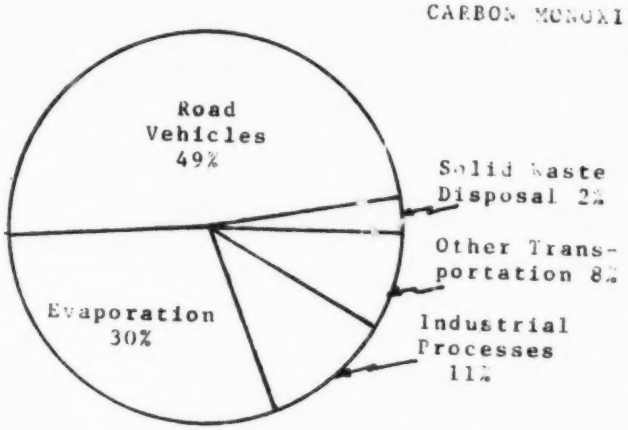
INCLUDING ROAD VEHICLES

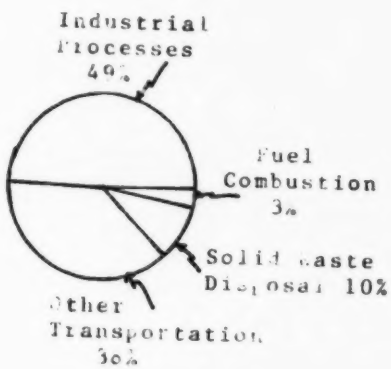


EXCLUDING ROAD VEHICLES

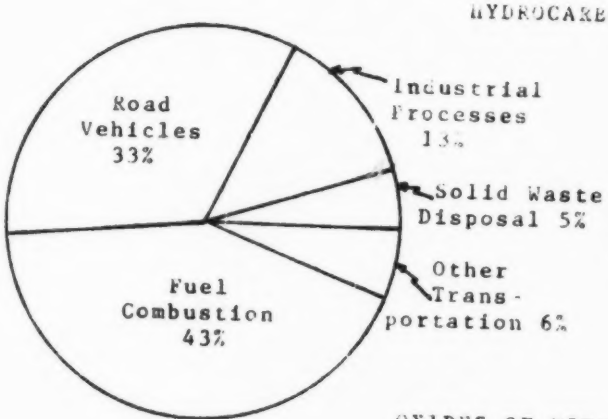


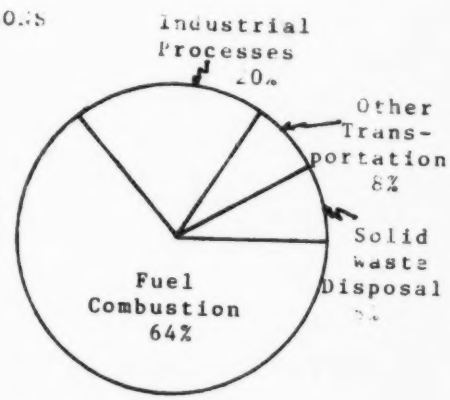
CARBON MONOXIDE





HYDROCARBONS





OXIDES OF NITROGEN

FIGURE 10 - (Continued) Estimated Distribution of Emissions by Source, Inclusive and Exclusive of Road Vehicles, Atlanta Study Area, 1968

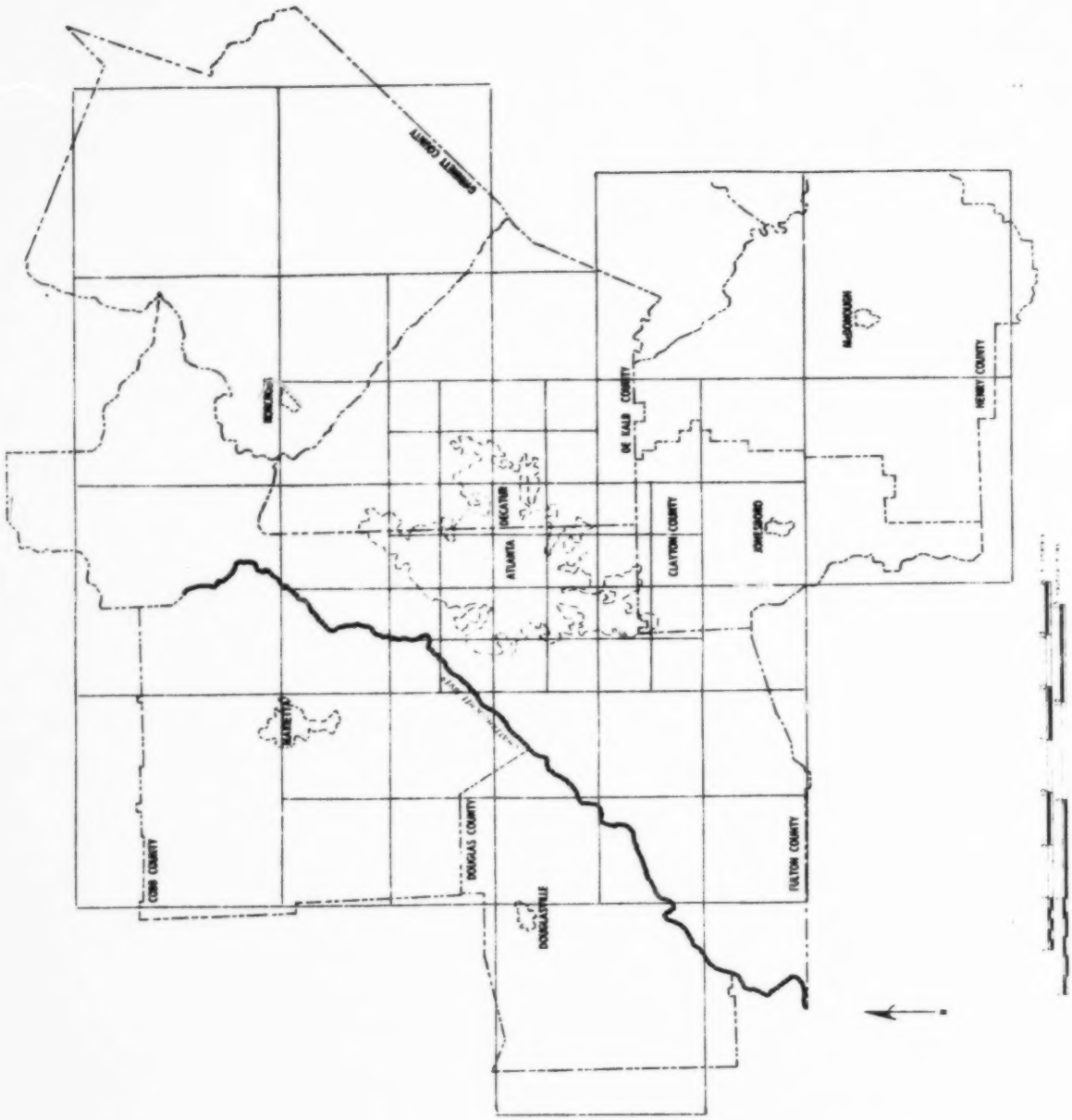


FIGURE 11 - Grid Coordinate System

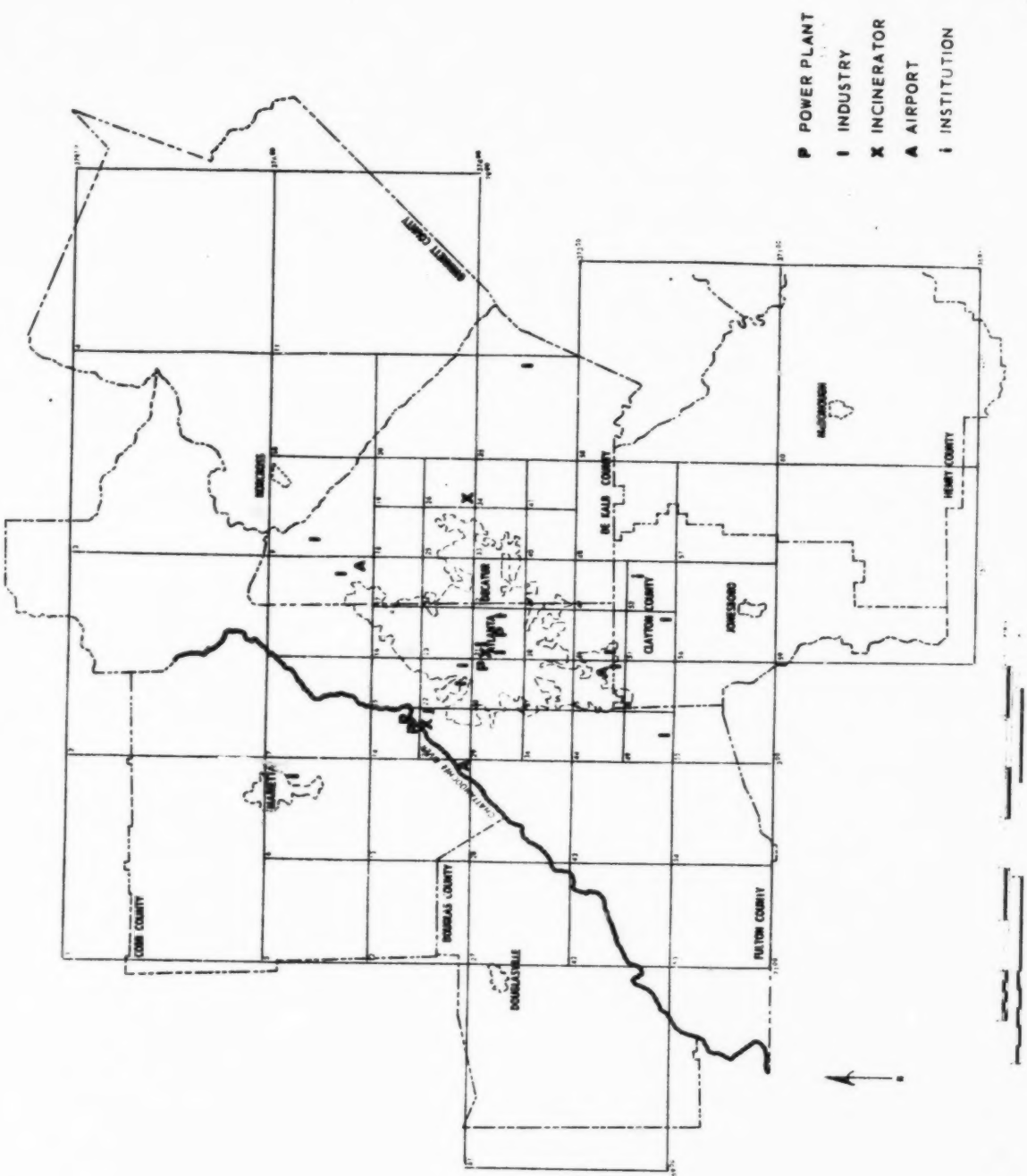


FIGURE 12 - Point Source Locations in Atlanta Study Area

Table VIII

Summary of Point Source Emissions by Season
For the Atlanta Study Area, 1967 (Tons/Day)

Source Category	Grid	SOx S	SOx W	SOx A	PART S	PART W	PART A
Industrial	6	.01	.21	.09	--	.09	.04
Industrial	8	--	--	--	--	--	--
Airport	8	--	--	--	0.18	0.18	0.18
Industrial	9	--	--	--	--	.05	.02
Airport	13	--	--	--	0.16	0.16	0.16
Power Plant	14	33.86	33.86	33.40	18.49	18.49	18.24
Power Plant	14	136.84	136.84	134.96	37.24	37.24	36.72
Incineration	21	.38	.38	.38	3.21	3.21	3.21
Industrial	21	.49	.49	.49	4.70	4.70	4.70
Industrial	22	--	--	--	.13	.13	.13
Industrial	22	--	--	--	.82	.82	.82
Incineration	26	.43	.43	.43	3.73	3.73	3.73
Power Plant	30	--	5.02	1.77	--	7.38	2.60
Industrial	31	.07	.07	.07	4.79	4.79	4.79
Industrial	31	2.64	3.78	3.11	0.20	0.29	0.24
Incineration	31	0.57	0.57	0.57	4.82	4.82	4.82
Power Plant	31	--	5.02	1.77	--	7.38	2.60
Industrial	35	--	--	--	.41	.41	.41
Airport	45	--	--	--	9.62	9.62	9.62
Industrial	45	.05	.06	.05	.05	.06	.05
Industrial	46	.01	.03	.02	.01	.04	.02
Industrial	49	--	--	--	.88	.88	.88
Industrial	51	--	--	--	2.06	2.06	2.06
Institutional	52	--	.59	.24	--	.22	.09

Table IX

Emissions from Total Sources in Atlanta Study Area by Grid (tons/day)

Grid	Area (mi 2)	SUM	SOx WIN	AVG	SUM	PART. WIN	AVG
1	154.40	0.24	0.82	0.48	1.12	1.29	1.19
2	154.40	0.21	0.22	0.22	0.88	0.90	0.89
3	154.40	0.06	0.25	0.14	0.59	0.64	0.61
4	154.40	0.08	0.45	0.23	0.30	0.41	0.34
5	38.60	0.02	0.02	0.02	0.16	0.16	0.16
6	38.60	0.28	1.15	0.64	1.23	1.54	1.36
7	38.60	0.18	0.19	0.18	1.02	1.04	1.03
8	38.60	0.30	0.31	0.30	1.83	1.86	1.86
9	38.60	0.15	0.23	0.18	0.67	0.77	0.71
10	38.60	0.02	0.15	0.07	0.14	0.17	0.15
11	154.40	0.03	0.20	0.10	0.18	0.22	0.19
12	38.60	0.05	0.05	0.05	0.30	0.30	0.30
13	38.60	0.04	0.05	0.04	0.44	0.44	0.44
14	9.65	170.77	170.79	168.43	55.99	56.01	55.22
15	9.65	0.06	0.06	0.06	0.38	0.39	0.38
16	9.65	0.18	0.21	0.20	0.60	0.67	0.63
17	9.65	0.10	0.11	0.11	0.42	0.44	0.43
18	9.65	0.08	0.09	0.09	0.34	0.35	0.34
19	9.65	0.03	0.05	0.04	0.14	0.17	0.15
20	38.60	0.05	0.09	0.07	0.21	0.22	0.21
21	9.65	1.22	1.35	1.27	8.72	8.88	8.79
22	9.65	0.33	0.48	0.39	1.88	2.09	1.97
23	9.65	0.38	1.07	0.67	1.06	1.45	1.22
24	9.65	0.16	0.35	0.24	0.59	0.68	0.63
25	9.65	0.12	0.28	0.18	0.43	0.50	0.46
26	9.65	0.47	0.47	0.47	3.89	3.90	3.90
27	38.60	0.00	0.01	0.00	0.33	0.33	0.33
28	38.60	0.15	0.17	0.16	0.69	0.71	0.70
29	9.65	0.11	0.11	0.11	0.54	0.55	0.55
30	9.65	0.45	6.32	2.58	1.28	8.98	4.01
31	9.65	4.03	13.20	7.51	11.77	20.84	15.06
32	9.65	0.22	0.45	0.31	0.81	0.91	0.85
33	9.65	0.14	0.34	0.22	0.51	0.59	0.54
34	9.65	0.08	0.09	0.08	0.34	0.35	0.34
35	38.60	0.04	0.05	0.04	0.58	0.59	0.59
36	9.65	0.07	0.08	0.07	0.25	0.26	0.26
37	9.65	0.23	0.32	0.26	0.69	0.85	0.75
38	9.65	0.31	0.83	0.53	0.94	1.26	1.06
39	9.65	0.08	0.18	0.12	0.31	0.34	0.32
40	9.65	0.02	0.02	0.02	0.08	0.08	0.08
41	9.65	0.01	0.01	0.01	0.06	0.07	0.06
42	38.60	0.01	0.01	0.01	0.02	0.02	0.02
43	38.60	0.04	0.04	0.04	0.32	0.33	0.33
44	9.65	0.06	0.06	0.06	0.21	0.21	0.21
45	9.65	0.24	0.28	0.25	10.27	10.35	10.30

Table IX

Emissions from Total Sources (cont.)

Grid	Area (mi 2)	SUM	SOx WIN	AVG	SUM	PART. WIN	AVG
46	9.65	0.12	0.15	0.14	0.31	0.36	0.33
47	9.65	0.02	0.02	0.02	0.07	0.07	0.07
48	38.60	0.03	0.04	0.04	0.08	0.09	0.09
49	9.65	0.04	0.04	0.04	1.01	1.01	1.01
50	9.65	0.04	0.04	0.04	0.28	0.29	0.28
51	9.65	0.09	0.34	0.19	2.64	2.71	2.67
52	9.65	0.02	0.61	0.26	0.18	0.41	0.28
53	38.60	0.02	0.03	0.02	0.25	0.25	0.25
54	38.60	0.03	0.03	0.03	0.26	0.27	0.26
55	38.60	0.02	0.02	0.02	0.08	0.08	0.08
56	38.60	0.07	0.32	0.18	0.63	0.68	0.65
57	38.60	0.02	0.02	0.02	0.08	0.08	0.08
58	154.40	0.01	0.01	0.01	0.01	0.02	0.02
59	154.40	0.06	0.31	0.16	0.19	0.25	0.21
60	154.40	0.02	0.18	0.09	0.05	0.09	0.07
61	154.40	0.05	0.37	0.18	0.76	0.84	0.79

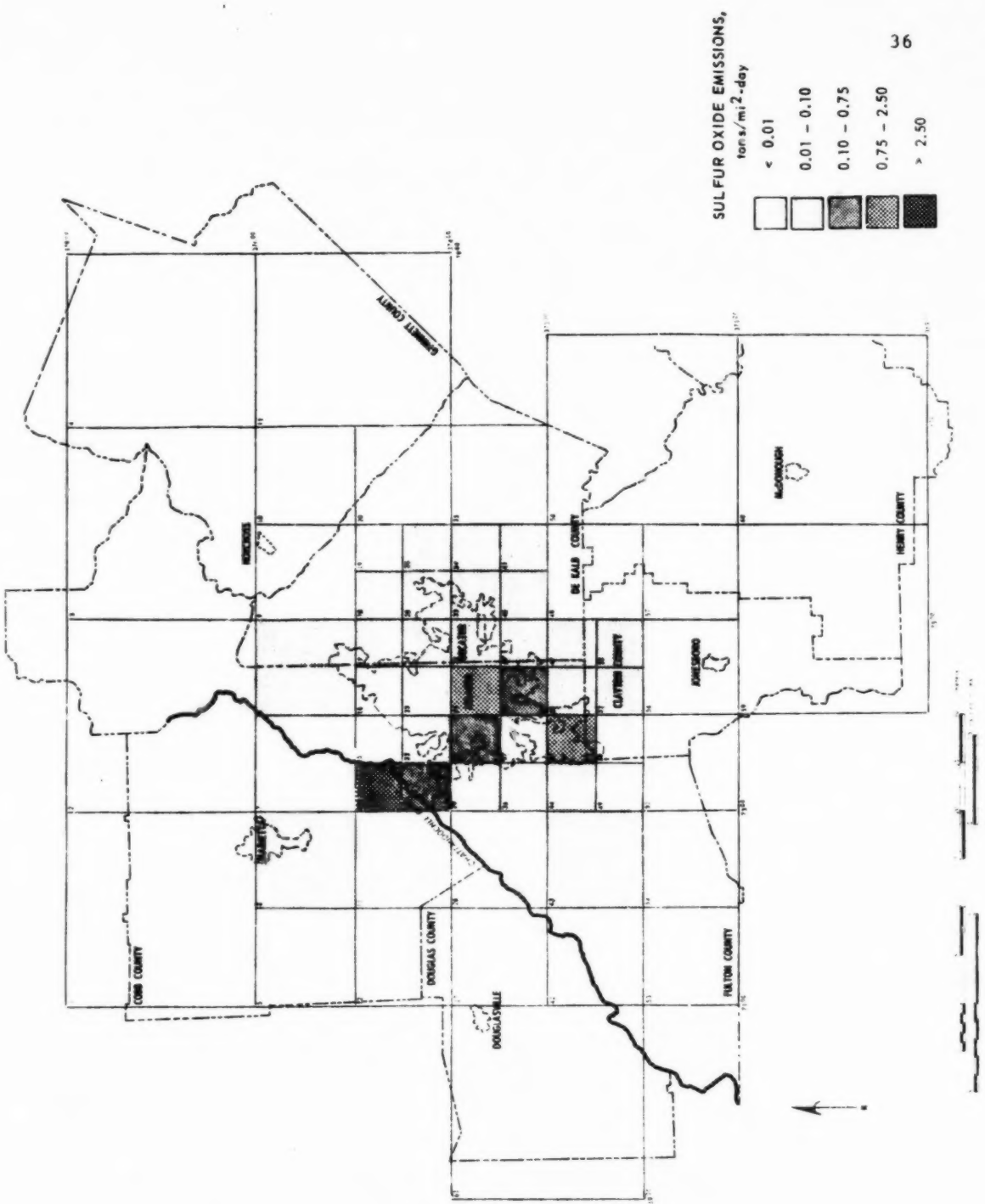


FIGURE 13 – Sulfur Oxide Emission Density from All Sources, Atlanta Study Area

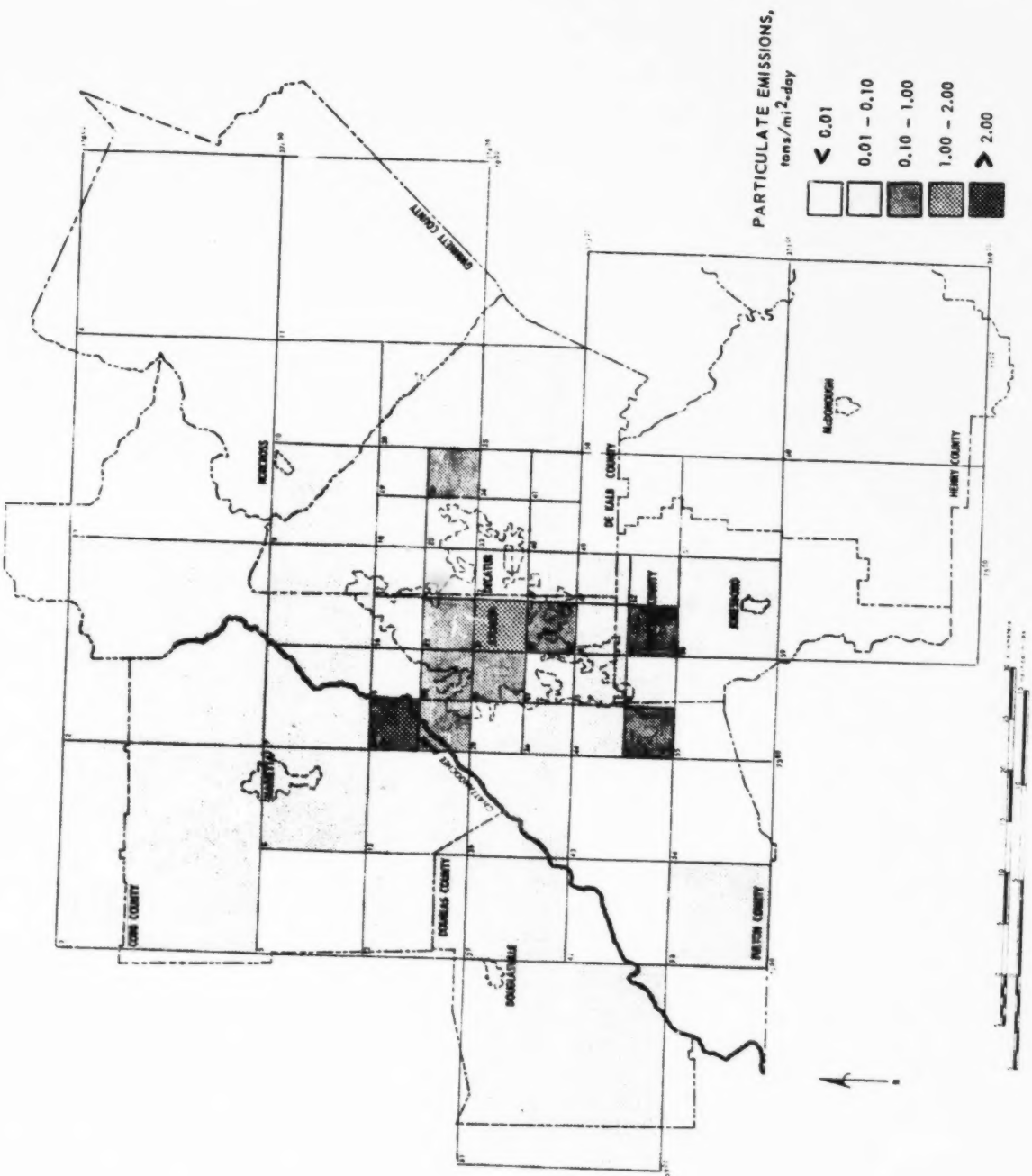


FIGURE 14 - Particulate Emission Density from All Sources
Atlanta Study Area

area. About 2 million tons of coal were consumed; 97 percent of this was used by the steam power plants. Residential and industrial users consume little coal because of the availability of natural gas from two major pipeline systems passing through Atlanta. Most of the oil consumed is low sulfur distillate fuel oil for residential heating. Relatively small amounts of higher sulfur residual oil are consumed in industrial operations. Coal used in the area has a low sulfur content (an average of 1.7 percent). The sulfur content of natural gas is practically negligible (an average of .0008 percent).

The present major electric power generating plants in the Atlanta area are the two steam plants on the Chattahoochee River in Cobb County. In addition to consuming most of the coal used in the area, these plants used about 13 billion cubic feet of natural gas on an interrupted basis and consumed a small quantity (7,000 barrels) of fuel oil. As a result, high emission densities are found in the grid zone containing these power plants even though the coal burned has a low sulfur content.

The Atlanta area is supplied power by the Georgia Power Company and the Southern Company, with interties to TVA and private utilities in Virginia and the Carolinas. Generally, utilities in the Nation have estimated power requirements as doubling every ten years. In the Atlanta area, capacity needs for the fucure have been planned for some time on the basis of

a doubling of power consumption every eight to nine years, a compound growth rate of eight to nine percent per year which has so far provided for Atlanta's needs even in a period of strong growth. Additional load requirements as determined by this formula are presently planned to be met by 1,494,000 KW of additional capacity at Cartersville in Bartow County as well as by new plants at locations more distant from Atlanta. No additional capacity is presently proposed along the Chattahoochee River.

There may be a problem of continued use of the low-sulfur coal presently burned at the Smyrna plants, as well as elsewhere in the statewide Georgia Power Company system, because of growing demands for such coal in the entire Atlantic Seaboard area. It is possible that higher sulfur content coal may have to be used at the two new large plants being installed at Cartersville located 5 miles to the northwest of Acworth.

About one-fourth of the particulate matter emitted in the survey area results from the incineration of refuse. The source location of incinerator facilities adds to the seriousness of the problem. In the central section of Atlanta, the air quality data indicate that significant quantities of particulate matter may be generated by demolition activities associated with urban renewal and expressway construction. These sources of particulate pollution are not included in the emission inventory but must be considered in an overall pollution control program.

AIR QUALITY ANALYSIS

The boundaries of an air quality control region should be designed to include both pollution sources and people and property affected by those sources. Sources and source areas were identified by the emission inventory discussed in the preceding section. The emission inventory does not, however, provide information about the location of people and property affected by the identified sources. Further examination of air quality data in the study area is necessary before the regional boundary can be described.

The best way to determine the atmospheric distribution of contaminants is to review air quality sampling data which have been measured over sufficient points and enough times to be useful. Air quality sampling networks in Fulton County have provided useful data for this determination. The available air quality data from such sampling, however, are not sufficiently comprehensive to fully describe the effects of pollutant emissions in the vicinity of certain large pollutant sources.

A meteorological diffusion model has been used to compute theoretical concentrations of pollutants in the ambient air. The model is based on a mathematical treatment of pollutant emissions and meteorological factors such as wind speed, wind direction, and mixing depths. While there are certain limitations inherent to the model (e.g. topographical variations are not

taken into account) it has been used to describe probable long term (seasonal and annual) average pollutant dispersion patterns.

METEOROLOGY

In order to understand the mechanism by which emissions are dispersed, an analysis of meteorological data is needed.

The general climate of the Atlanta area is a function of its altitude (900-1,000 feet above sea level) and its relationship to the Atlantic Ocean and the Gulf of Mexico. The mountains to the north and west tend to partially block southward movement of polar air masses so that normal winter temperatures are above freezing.

Surface winds in the area vary on the average from 7 to 12 miles per hour over the year, adequate for ventilation but seldom unpleasant or damaging. The winds prevail from the northwest during the winter months, and during the summer they tend to be westerly and from the northeast (Figure 15).

An important factor in the dispersion of pollution is the depth of the air layer through which pollutants mix (Table X). Dispersion in the Atlanta area is greatest during summer afternoons, but tends to be restricted during mornings throughout the year.

Prolonged periods of stagnation conditions, when there is very little wind movement, are considered periods of high air pollution potential. The Appalachian Mountain chain develops a

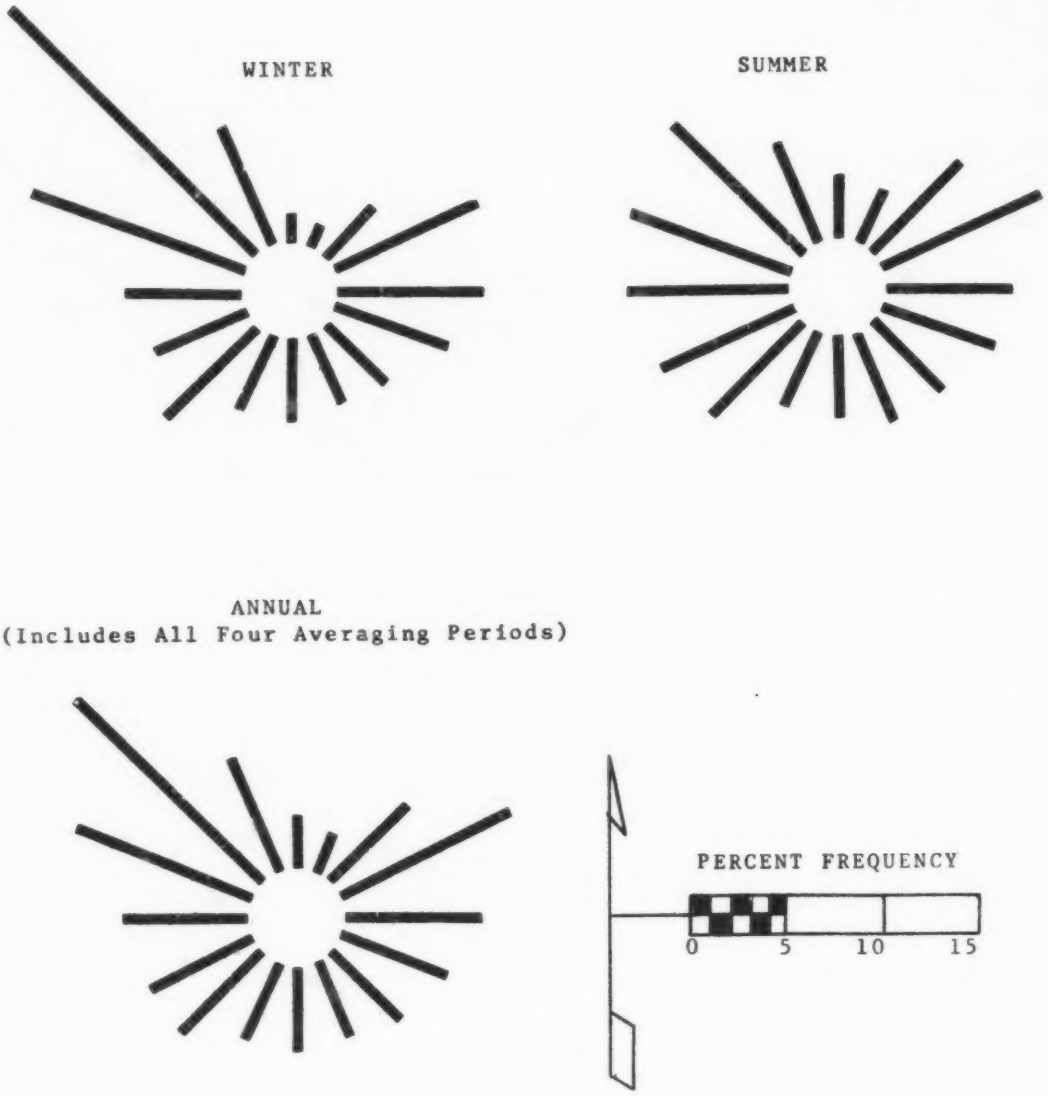


FIGURE 15 - Wind Direction Percent Frequency of Occurrence for Various Averaging Times

significant number of such days, and Atlanta, near the southern terminus of the mountains is affected by more than half of the forecast high pollution potential days. Stagnation periods are more than twice as likely in the Atlanta area as in cities such as Baltimore, New York, or Boston. Additionally, shorter term temperature inversions are quite probable, particularly in the fall. These inversions tend to place a "lid" on the atmosphere for periods of four to eight hours, generally disappearing by early afternoon. Low mixing depths in the morning coupled with the inversion "lid" create short-term periods of seriously degraded air quality which are not reflected in tabulations of "average" air quality.

TABLE X

MIXING DEPTHS

Atlanta
(in meters)

	Winter	Summer	Annual
MORNING	350	380	340
AFTERNOON	975	1,870	1,490
AVERAGE	665	1,125	915

MODELING RESULTS

The contours defined by the diffusion model have been combined

in Figure 16 to show theoretical concentration of sulfur oxides and particulates in winter and summer. 11/ Note that the diffusion of pollutants in the area is relatively well-contained in and near the city of Atlanta. This distribution is explained by the generally moderate air currents usually encountered here.

AIR SAMPLING DATA

The Fulton County Health Department maintains a sampling program which includes both fixed-station continuous sampling and a trailer installation which is used in various parts of the County.

Measurements of sulfur dioxide by the Health Department confirm the NAPCA inventory and diffusion model. In the February 1969 report of The Air Pollution Control Section, it is stated that ". . . the highest concentration of 0.420 parts per million (1201 micrograms per cubic meter) occurred when the trailer was in the vicinity of the two large power plants which burn coal." Figure 17 represents measured sulfur dioxide levels from the Health Department trailer survey over the period August 1967 to July 1968.

Sampling data for particulates in the period, July 1967 to September 1968, from 203 samples at fifteen stations within Fulton County, show a median of 107 micrograms per cubic meter. The highest measurement was 999 micrograms per cubic meter, and

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11/ It should be kept in mind that the concentration contours resulting from the diffusion model are theoretical in nature and not intended to represent measured ambient air quality. The contours are most useful as a general guide for the further examination of areas most likely to be affected by emissions.

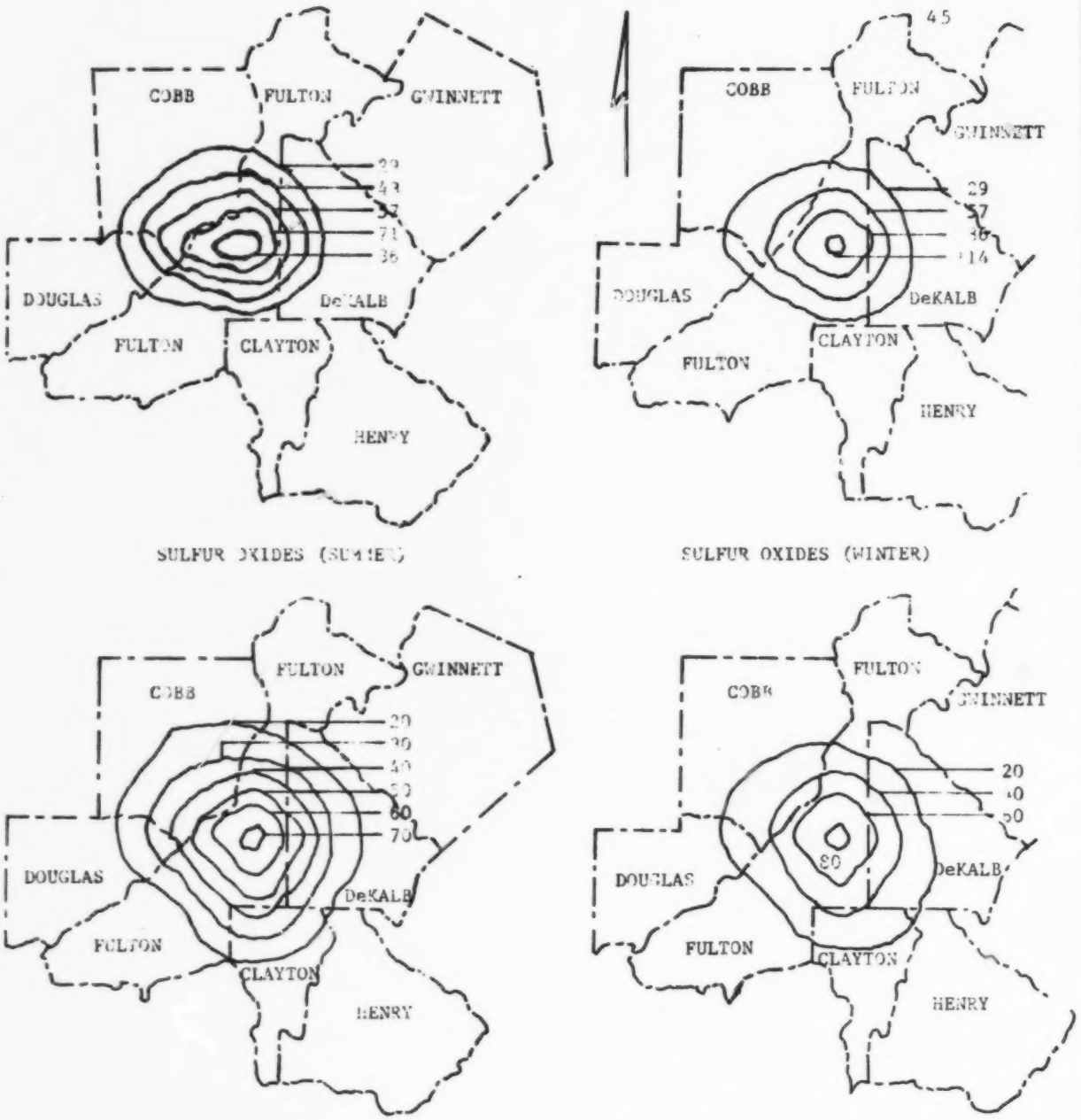

FIGURE 16 - Theoretical Concentrations: Sulfur Oxides and Particulates. Values in Micrograms per Cubic Meter

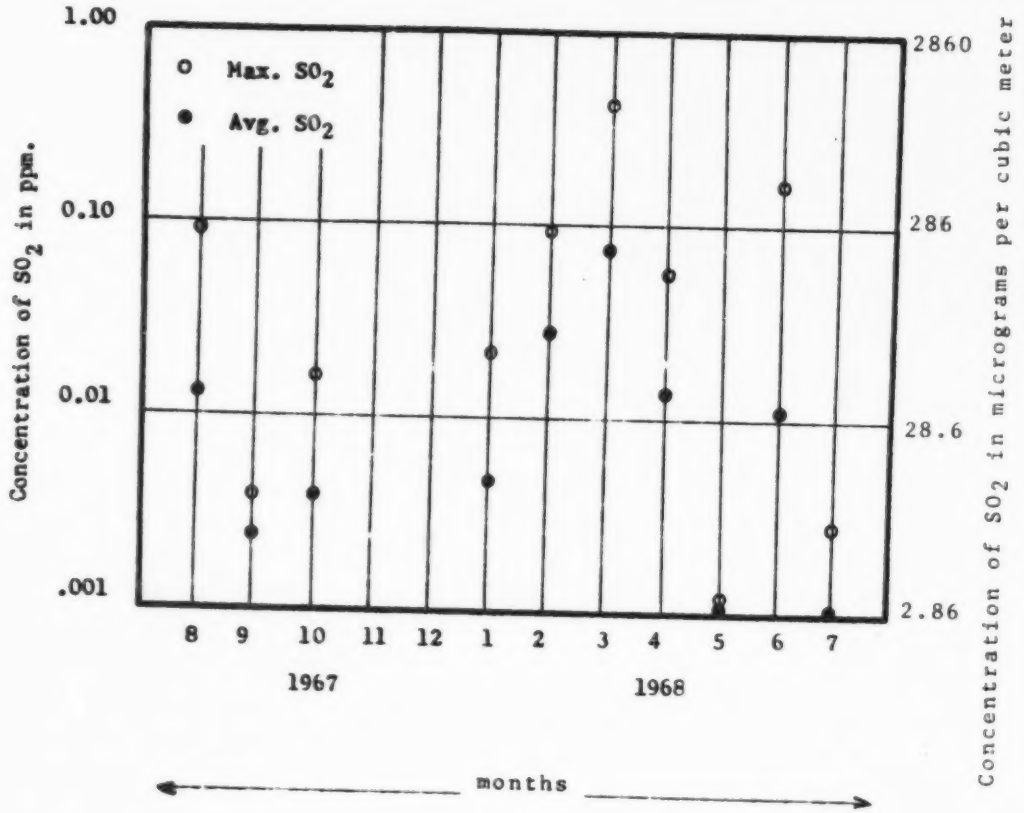

FIGURE 17 - Measured Sulfur Dioxide Levels; Fulton County Health Department, 1967-68

the lowest, 34 micrograms per cubic meter. Trailer samplings at seven sites in Fulton County measured a high of 796 micrograms per cubic meter (in midtown Atlanta, March 1969) and a low of 39 micrograms per cubic meter (at a rural site north of the City).

TABLE XI

PARTICULATES

(micrograms per cubic meter)

SITE	1	2	3	4	5	6	7
HIGH	222	282	796	96	150	461	376
LOW	109	142	587	39	81	77	85
AVERAGE	152	216	695	76	118	178	167

Figure 18 identifies the sampling locations.

Analysis of the emission inventory, the diffusion model, and the air quality data clearly supports the conclusions of the 1969 Fulton County Health Department Report:

"1. Fulton County has an air pollution problem.

2. The automobile is the County's major source of pollution.

3. 88% of SO_2 originates from the burning of coal by the Georgia Power Company.

4. Heavy industrial areas, resulting from zoning, concentrates industrial emission and creates zones of high pollution.

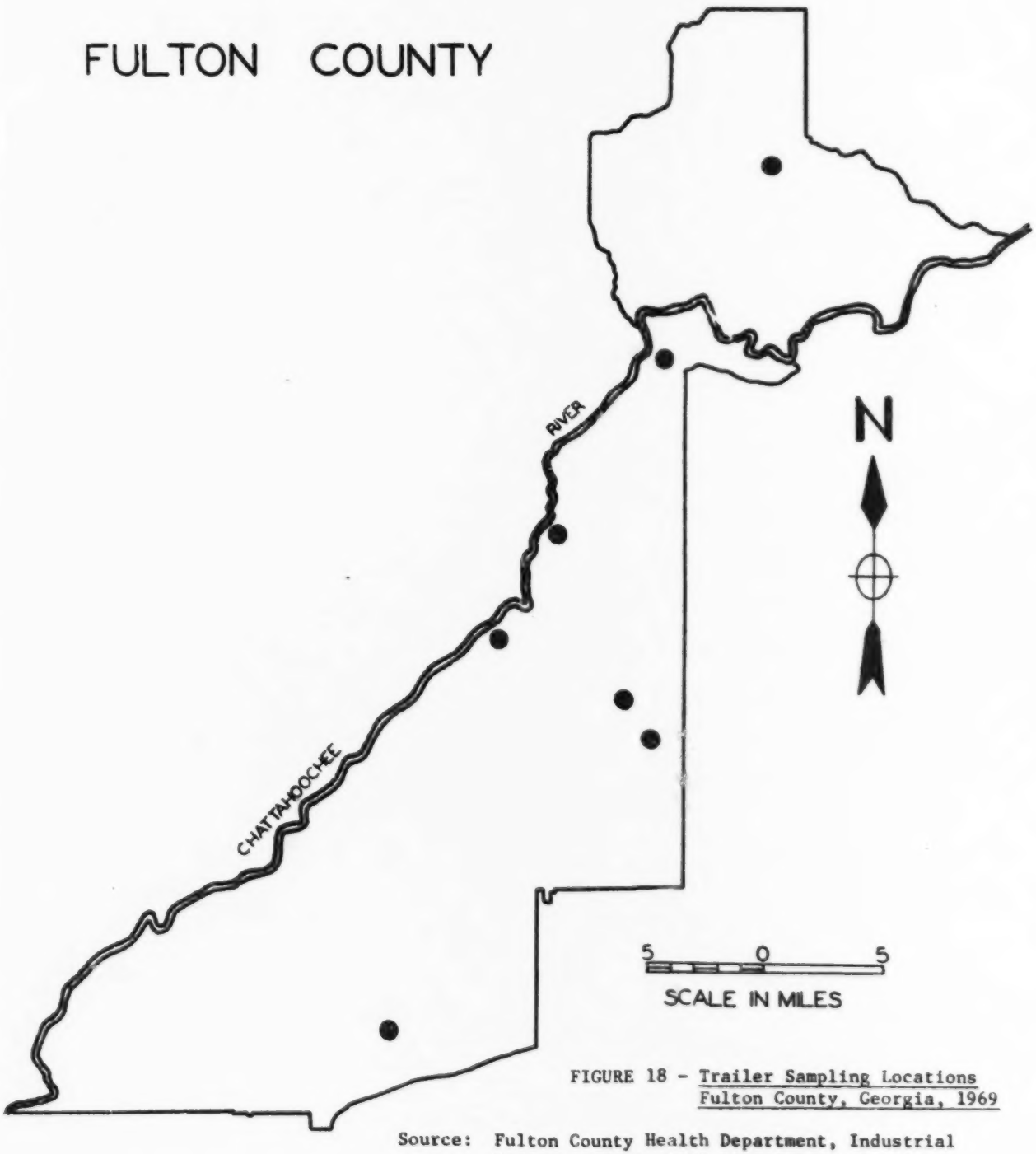

FIGURE 18 - Trailer Sampling Locations
Fulton County, Georgia, 1969

Source: Fulton County Health Department, Industrial Hygiene and Air Pollution Control Section.

5. Ambient air, continuous monitoring will provide a baseline against which industrial areas can be evaluated.
6. Excluding transportation as a source, particulates, or visible emissions, make up about 31% of the total and their control would be that most noticed by the public.
7. Federal regulations on vehicle emissions are mandatory if Fulton County is to improve its general air quality."

REGIONAL GOVERNMENTAL ORGANIZATION

The Atlanta area is located entirely within the State of Georgia. Within the area, the Atlanta Standard Metropolitan Statistical Area encompasses Fulton, DeKalb, Cobb, Gwinnett, and Clayton Counties. These five counties form the Metropolitan Atlanta Council of Local Governments (MACLOG) and the district covered by the Atlanta Region Metropolitan Planning Commission (ARMPC) (Figure 19).

Atlanta is a major Federal regional center, containing the regional offices of most Federal agencies, including the Department of Health, Education and Welfare. Both a United States District Court and the Circuit Court of Appeals are located here. The City is also the Georgia State Capitol. It is, therefore, an important governmental center for all levels of government.

PLANNING ACTIVITIES

The principal intergovernmental coordination agency in the area is MACLOG, organized in 1964 with representation provided for each of the local governments in the five-county region. MACLOG's activities are closely related to those of ARMPC, the official planning agency for the five-county region.

MACLOG has a full-time staff of six persons including a Coordinator, which functions under an Executive Committee of elected public officials. Together with ARMPC, it has carried out an ambitious work plan including a 1967 Solid Waste Disposal

FIGURE 19 - Atlanta Standard Metropolitan Statistical Area (Five counties also encompass MACLOG and ARMPC)

Study, a review of fire protection in the area, a library project, and the establishment of Metropol, a law enforcement project for the area. Its present work program includes additional participation in Comprehensive Health Planning, improvement in regional library services, and continuation of the Metropol law enforcement project.

Planning by the Atlanta Region Metropolitan Planning Commission has been extensive. Elements of a comprehensive plan have been published, including parks and open space, sewer and water, population and employment, capitol improvements, and codes. Work is continuing on the 1988 Regional Development Plan. ARMPC was authorized by the Georgia legislature in 1960 to "make...a master plan for the orderly growth and development of the district as a whole." It adopted in 1968 a goals statement which has been recommended to all of the metropolitan area governments.

Additionally, Atlanta and Fulton County have a Joint Planning Board, and the City of Atlanta maintains a Planning Department. Planning for the City of Atlanta is coordinated with ARMPC activities, and the City's comprehensive plan is being updated in the four elements of Community Facilities, Land Use, Major Thoroughfares and Public Improvement. The Atlanta Area Transportation Study, now nearing completion, involves elements of each of these planning agencies.

The Community Council of the Atlanta Area, Inc. has been designated as the 314 (b) agency (Comprehensive Health Planning)

for the region. Additionally, the area is served by the Georgia Regional Medical Program.

Various parts of the larger 19-county area are included in three different Economic Development Districts, and the northern tier of counties are in the Appalachian Regional Commission area.

AIR POLLUTION CONTROL ACTIVITIES

Air Pollution Control programs are generally supervised by the Georgia State Department of Health under 1968 legislation. Fulton County has an active local program under regulations similar to State regulations passed in 1969. The County Health Department is encouraging the enactment of regulations in all of the municipalities under its jurisdiction. There are no active local programs in the area other than that in Fulton County.

The Fulton County program has been a leader in the State in planning and implementing a program. It employs twelve people and proposes a 1970 budget of $156,000. Among its current projects are:

Registration of pollution sources in the County

Reviewing construction plans for proper control equipment.

Expanding air quality sampling.

Joint industry - health department compliance program.

Public education.

INDICATED AIR QUALITY CONTROL REGION

Subject to the scheduled consultation, it seems appropriate to consider an air quality control region in the Atlanta area consisting of the following counties (Figure 20):

Clayton
Cobb
DeKalb
Douglas
Fulton
Gwinnett
Henry

DISCUSSION

An air quality control region should meet these basic conditions:

1. It should encompass most pollution sources as well as most people and property affected by the sources;
2. It should include those areas where industrial and residential growth may create significant future problems.
3. It should be consistent with unified and cooperative administration of the region's air resources.

The Evaluation of Technical Factors section of this report discusses the first condition, the Evaluation of Urban Factors deals with the second, and Regional Governmental Organizations covers the third condition.

The diffusion maps, taken together with the emission inventory and available air quality data, show principal sources

FIGURE 20 - Proposed Atlanta Air Quality Control Region

and effects centered in and immediately surrounding the City of Atlanta. These data do not, however, take into account the probability of sources and effects which may be found in the industrialized areas surrounding the SMSA. Therefore, while it can be concluded that the SMSA should be included in the air quality control region, technical factors alone do not permit the determination of outer boundaries because of insufficient data for the outlying counties.

The Atlanta area is characterized by great diversity and geographic dispersion of manufacturing linked together by an excellent transportation system. Even though ARMPC proposes limiting outward development over the next twenty years, it does not appear likely that existing trends can be sufficiently changed to prevent continuation of diffused development into adjoining counties. Both the transportation network and the availability of land appears to support this. If this assumption of continued centrifugal growth is valid, then comprehensive planning activities in the region must take it into account; of particular importance will be the development of adequate water resources in the south and west of the region.

The Atlanta area is fortunate that, with the exception of the automobile, pollution sources are not yet beyond control. By establishing an air quality control region now, the area will preserve its opportunities for effective air quality control programs.

The third point - consistency with unified and cooperative administration of the air resource - is in part satisfied because the proposed Region is entirely intrastate. While it is true that neither MACLOG or ARMPC presently concern themselves with the entire area, all of the area over which they have jurisdiction is included. Further, the air quality control regulations now in force in Fulton County are closely tied to existing State regulations, so that conformity between differing regulatory schemes is not a difficult problem. And finally, it is probable that MACLOG and ARMPC will have to expand their planning boundaries as further development takes place.

At the same time, continuing consideration must be given to future inclusion of additional counties, especially Bartow, Hall, Rockdale, Spalding, Fayette, and Forsyth. To the south, the city of Griffin, in Spalding County, is already a sizable manufacturing community.

To the northwest, Cartersville in Bartow County, the site of two new power plants, is becoming a chemical and plastics center; Gainesville in Hall County is a major food processing center. Further development can be expected along the northeast and northwest corridors which are centered on the interstate highways.

The indicated Region offers the opportunity to develop an effective regional effort to prevent, control and abate air pollution in the Atlanta area. It preserves county boundaries and includes within it the entire jurisdiction of regional planning organizations.